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Original Contributions.

DENTAL SCIENCE AND LITERATURE—REPORT OF COMMITTEE.

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The review of the literature of the year is a considerable task even if it is only tolerably well done, as dental literature is growing continually. Every year is adding to the volume; not so rapidly perhaps in one sense, but as the years roll on the increase becomes very considerable. The number of books is not increasing so rapidly as is the number of original articles in the journals. Our journal literature is increasing in volume very materially. The same journals that last year gave us four hundred original articles give us nearly five hundred this year, and this notwithstanding the fact that the journals have reduced their subscription prices in the interim, so that we get them for about half what we paid before. I have been curious to know what the influence of these lowered prices would be upon the quality and amount of material furnished readers. Thus far it seems to have increased rather than diminished it.

Of the text-books on dental subjects this year I find twenty-two. None of them is epoch-making. There are some very good books; a number of them are new editions of old books.

There are some new features creeping into our journal literature this year. One of these is the biographic sketches introduced to this society by Dr. Fuller of St. Louis last year. (DIGEST, November, 1902, p. 947.) Some of the journals have taken this matter up and given us monthly biographies of important individuals. Many of them are very interesting. The historical feature of these sketches is very important and will be more so in the future. There are a considerable number of them—there have been twenty-four

in the five journals that I have consulted; *Cosmos, Items, Review,* DIGEST, and *International.* It would be very difficult to sum up all this matter in any one report—to digest all the literature of the year, and it is not my intention to do so but merely to show the trend of thought in the profession during the year.

Any young man who reads the original articles in these journals will have a good digest of the thought of the profession for the year; will cover almost the entire field of dentistry, and will bring in review the thought of the better men of the profession. While there are some articles that may seem uninteresting, there is some good to be gotten out of every one we read. The nearly five hundred articles will not make a tiresome job of reading if it is done regularly each month as the journals are issued.

These biographical and bibliographical essays are important. There are a number of sketches of very old books given this year in the journals; some are so old that I suppose they were written almost before dentistry began. I shall not try to point out the original books.

There are also a number of papers on dental nomenclature, showing a greater interest in this field than has existed for some years. Our nomenclature is better for it.

I notice a feature in the literature of the year just past that was not prominent before, and it probably marks a need that is being felt. It comes in the form of criticism of society reports. Some fourteen papers have been devoted to such criticism, and most of them are complaining of some particular thing. I think it is well for us to heed this and be more careful of our reports in the future. In the Transactions of this Society for last year I noticed a number of typographical errors that are annoying to the men who presented the papers. In my report last year there is a line dropped out and it appears five or six lines farther down the page. Such things should not occur in our printed reports, but nearly all have some such fault. This is not peculiar to the report of our Society, but it is common to them all. I throw this out as a reminder that we should take more care in reporting society proceedings.

The criticism is also made that in the journals the report of the discussions is very materially separated from the papers. That is true and very annoying. Often we have to wait for two or three months or even longer after the publication of a paper before we

obtain the discussion of that paper, and in that way the force and educational power of the discussion are practically lost. There are few who are content to read the discussion of a paper months after having read the paper.

We have the usual number of presidential addresses. Many of them are very interesting reading, yet they are not as a rule upon subjects that are of lasting interest, although in the meeting itself they are a very interesting feature. Some sixteen such addresses are published in the journals mentioned.

I note also some interesting matter that I have tabulated under the head of "Status of Dentistry and of Dentists." This is a curious feature of our literature, being a discussion of the position the dental profession occupies and the position it should occupy; criticisms of the views that are held of dentists by physicians, by other professional men, and by the public at large, all of these running in some degree along the lines of our president's address today. There are twenty-six papers during the year based on subjects of this general character; pointing out what the dentist should be and what he fails to be.

There are a few of these bearing on the dentist in the hospitals. This I take to be a very important feature of the literature of this year, pointing out the necessity for the regular attendance of a dentist in hospitals. A large number of the surgical operations that are now done in hospitals by the general surgeon should be done by dentists who should be on the hospital staff, but unfortunately very few of our hospitals are so provided. It seems to me that all should be so equipped, and some of these articles are along this line.

A new series of papers has entered into our literature this year that has been stimulated somewhat by the *Dental Summary* that is out of the line of journals I have tabulated in the report. These papers relate to methods of teaching and class-room work in our dental schools. Although these papers are particularly interesting to the teacher, they ought to be of interest to the general profession as well. It gives us a better view of what is being done in our schools. The *Summary* is making a specialty of this line of work this year; but the twenty-four papers on subjects of this character that I have tabulated have appeared in other journals. The papers in the *Summary* are all written by teachers and I regard them as very important.

On that dry old subject of Anatomy and Physiology we have twenty-four papers, and they are interesting and important. Some of them relate to new things discovered and they are as important for our young and old men as any list of papers in the group of nearly five hundred. They relate to almost everything connected with the anatomy of the teeth, jaws, face and neck. Very few of them consider other regions of the body. They are nearly all directly in the line of our special work and for this reason are important. Some of them are histological rather than anatomical.

In dental pathology we have a large number of articles and a very interesting series of papers, some of them by our strongest men. Nineteen of these papers deal with pathological questions along the line of development of thought, reaching out into the unknown realms of pathology in the effort made to elucidate pathological problems. There are ten on pyorrhea alveolaris and a few on the prophylaxis of caries. The same difficulties remain that have always been with us in the discussion of pyorrhea. No one has as yet seemed to be able to get hold of this subject in a manner permitting of succinct elucidation.

A very important series of papers was presented by Dr. Miller of Berlin on the transparency of dentin. The reason for this transparency; transparent bands, etc., have all been discussed by him. Another important paper is written by Dr. Kirk on the use of the polariscope in the study of dentin. The polariscope is entering into our work, and my impression is that it has come to stay. Many of those present saw the polariscopic demonstrations given by Dr. Kirk during the anniversary meeting of the Chicago Odontographic Society. You saw the beautiful colors on the screen and the colorations because of the decomposition of light between the prisms of the polariscope and the specimens examined. But before we can hope to understand the teachings of the polariscope it is necessary that we study polarized light and the reactions produced by crystals, etc., on polarized light. Naturally it would not surprise anyone if some mistakes should be made in the beginning of this work. The polariscope is not new. I remember thirty years ago I spent almost my last dollar to get good prisms for my polariscopic outfit. I used them for a good while, tried to understand it, failed, and laid it aside, and yet I learned a good many things about it. I have been trying it again recently. I do not

know whether I understand its teachings, but I do know that we shall have to have better instruments or we will be badly deceived by the results of our instrumentation. This crops out in the article by Dr. Kirk on the polariscopic examination of dentin. I do not blame him for it, I blame his instruments. I know full well that the pictures detail just what Dr. Kirk saw. His photographs show just what his instruments delivered to him, and yet they evidently show a false view. That is easily demonstrated by another class of polariscope besides the one upon which Dr. Kirk has depended. In the examinations that were being conducted by him and by our friend in Paris, Dr. Michaels, the polariscope plays a very large figure, and in that also we will have deception unless we are cautious as to the completeness of the instruments used.

I do not wish to go into this matter further, but I hope it will interest the profession and that this interest will lend encouragement to the men who work in this line of research. It is a very important line, one that is promising wonderful things for the future. Men will take a few drops of saliva brought from an individual they have never seen, and will tell you that this person's teeth are decaying rapidly. Another has some decay, not much, and another person is immune to it. They will do it with certainty in case after case. What this means none of them seems ready to say, but it promises great developments for the future. One of these papers indirectly relating to caries was introduced by Dr. Kirk and is included in this list.

Then we have the translation of Dr. Michaels' little book, which I wish we could all read understandingly, but I fear there are few of us who can do so. Few in the profession can be benefited by this book, only those who are well posted in physiological chemistry, but they will derive great benefit from the study of this particular book.

Only five papers were devoted to oral hygiene last year. The year before there was a considerable number more than this. They seem to have dropped off and other things have taken their place.

I must not omit to mention the paper on the growth of microorganisms in the saliva (DIGEST, June, 1903, p. 708) by Dr. Miller, which seems to be, considering the sentiment expressed, in opposition, as it were, to the views expressed by Drs. Kirk, Michaels and others. He finds just what I should have expected him to find,

what I have found myself. It is a very interesting series of papers showing the crossfire that is going on in the study of caries of the teeth. Some of you may not get this idea so plainly as I seem to have it, and yet it is in a manner a denial of certain things expressed by others. Not a denial in so many words, for Dr. Miller does not attack any one in his papers, yet the facts as adduced would on the face of them seem to do so. He fails to find the bacterial plaques that I have spoken of, and that Williams has spoken of as relating to caries of the teeth, but seems to find all the elements necessary to produce caries in the mouths of immunes as well as in the mouths of persons where the teeth are decaying rapidly. All of the conditions he mentions are there. He is certainly correct and in accord with my own observations, except the one fact of the failure to find the particular kind of plaques that I have described.

We come now to operative dentistry. Here we find the largest number of articles, throwing together those things that we bring as a rule under the head of operative dentistry—instruments, fillings, inlays, pulp treatments, use of cement, etc. This makes eight and one-fourth articles per month; ninety-nine articles in a year, and there are a few more that properly belong to the subject, making it considerably over one hundred. This very considerable number of articles devoted to the filling of teeth shows the direction of thought as clearly as anything we could conceive. Nothing in the subject of operative dentistry has been left out in this discussion. Eight and one-fourth articles per month devoted to this subject by five of our journals, or nearly two articles per week. Now what young dentist is there who cannot read, and read carefully, two of these articles each week with benefit?

We have not so many articles devoted exclusively to porcelain inlays as we had last year. Only eighteen are on this subject, and yet there has been a pretty good discussion of inlay work. The inquiry in regard to inlays is continuous and has been throughout the year. In many of the articles not particularly devoted to inlay work the inlay is mentioned or carefully discussed, and in the articles devoted to filling with gold, amalgam, cement, setting of crowns, etc., the inlay is continually coming in for its quota of discussion, showing the continued interest in this work.

I would like to utter just a word of caution here as to inlay work, and perhaps some of you can in the discussion bring out the caution

more strongly. Undoubtedly the inlay has its place in dentistry and has come to stay. The question now beginning to be discussed, and which will come up more frequently in the future, is the place of the inlay—where it belongs; where it can do the most good, and where it should not be placed.

On the question of the management of children's teeth I was glad to find eight papers devoted exclusively to the handling of children in the dental chair, in which was emphasized the gaining of their confidence so that they could be operated upon favorably, showing that the profession is taking an increased interest in that subject, and also that it is willing to do more than it has heretofore been doing. That I regard as a very hopeful sign, a very important and hopeful trend in the discussion of the year.

We come now to prosthetic dentistry. Artificial dentures come in for a considerable number of the fifty-five papers on this subject. The handling of plaster of Paris, I am glad to say, comes in for an increased amount of interest. A substance that we have used so long and yet do not know its vagaries. It has been discussed; imperfect instrumentation has been used in the effort to study it, and the inquiries are increasing continually as to the management of plaster. I am sure that the next year or two will bring out much that is new on this subject. In fact, the development during the last year has been considerable.

Almost every phase of prosthetic dentistry has been carefully discussed in these fifty-five papers—a whole school to the young men who are just going into practice, and to the older men as well. The occlusion of the teeth comes in for a large share of interest. Bridges, crowns, and similar appliances have been taken up. Method after method is described; many of them in detail, some of them but briefly.

The regulation of teeth comes in for a continued interest. We have twenty-eight very well written papers on that subject. This stimulation is largely due to the work of the Society of Orthodontists, just as the work on teaching methods has been stimulated by the Pedagogic Association. The whole field of orthopedics is well gone over.

Oral surgery is also demanding a larger number of contributions than heretofore. In these five journals thirty-three papers are devoted to oral surgery and a description of operations and surgical

cases. I treated of that pretty fully in my last report. The interest has not only been kept up but has increased during this year.

Ethics and jurisprudence come in for twelve papers; a paper each month on the subject of ethics and the laws regulating dental practice. The ethics have absorbed most of the interest in the papers presented.

In nearly all the papers upon operative dentistry we find more or less interest in that particular feature of operative dentistry, extension for prevention. The discussion is going along on very good lines; the subject is becoming better understood; dentists are gradually learning the particular conditions requiring extension and are carrying out the work better every year. The idea that extension for prevention means cutting big cavities is giving way more and more. The intrinsic reasons for this extension are being better understood and the work is being performed satisfactorily by a large number of dentists.

There are scattered through these papers allusions to malformations, but there are no articles that I would classify as especially upon malformations.

This makes a considerable roll of papers to be read during the year, and yet one who apportions his time, as the dentist can readily do, can read carefully all of that literature, going over the whole subject, as it were, each year. No matter whether you be young or whether you be old, you have need to read this literature slowly and carefully with a view to understanding and deriving benefit from it.

Discussion. *Dr. C. E. Bentley,* Chicago: Dr. Black mentioned that a number of articles have been written looking to an improvement of our society reports. The DIGEST had an editorial on the subject in the March issue that was well worth reading. Much time and labor is uselessly expended on a great deal of our society work. If an editing committee had the power of separating the wheat from the chaff it would be better for our societies. We as dentists do not write logical papers, although we are improving in this direction, but we have not attained the perfection we should have. By a logical paper I mean that a man can say what he wishes if he will lay down a premise, and will argue to the corollary and come to a definite conclusion, but then it is time for him to stop. Unfortunately a large number of papers have crept into our litera-

ture that are not arranged along that line, and the discussions are infinitely worse. Our papers as a rule are not written according to the laws of formal logic—the arguments are loose and the conclusions faulty. The step taken by some of our journals in asking for better papers is an excellent move in the right direction; it is a healthy sign of a growing profession.

The essayist referred to the awakening interest in prosthetic dentistry. Last year a number of the articles on this subject dwelt on the matter of occlusion. We are now getting at the scientific basis of occlusion, which indicates an increasing interest in a branch of dentistry to which heretofore little attention has been paid.

Dr. C. N. Johnson, Chicago: Dr. Black forcibly reminded us that we have many mistakes in our literature. This is a deplorable fact, but the mistakes are not always due to the editors so much as they are in these later years to the printers. Most journals are now set on the linotype machine. If a single letter in a line is to be changed after the article is set up the entire line must be reset, and in doing so the linotyper may make another mistake. The editor and proofreader may correct an article perfectly, but in passing through the linotyper's hands a line may be dropped, which accounts for some of the most deplorable errors in our literature. Time and again I have passed in an article properly corrected, but when it appeared in print it was a disgrace to everybody connected with it.

When a man prepares a paper to read before a society he should at least put his name on it, so that the editor will know who wrote it. It is a common thing for a paper to be turned in without even the author's name on it. Each paper should bear a title, the name of the author, his degrees and his place of residence. Special care should be taken in the spelling of technical terms and proper names. The mistakes in our literature in the proper names of dentists are deplorable, and the mixing up of initials is a source of much worry and annoyance. Writers should have some little consideration for the editors and publication committees.

Dr. Edmund Noyes, Chicago. I would call the attention of the members of this society to the authority under which editors and publication committees act, as found in the By-Laws, Article I, Section 6—"The members of the publication committee shall superintend the publication and distribution of such portions of the Transactions as the Council may direct, or the committee judge to

be of sufficient value, and shall have full authority and power to cut down and amend or leave out such matter as they deem best for the proper preparation of the Transactions for publication." Men are naturally somewhat sensitive about having their papers altered, yet every editor will tell you that a large number of papers require much revision. A great many things are said in discussions that are repetitions or irrelevant or useless for publication. A man who makes a speech in a society does not like to have cut out the only thing in it that he really cared about, yet there are few speeches that do not require cutting down, and the editor must have the right to do it.

Dr. J. N. Crouse, Chicago: Dr. Black speaks of a line in his report of last year appearing in the printed transactions some lines below where it should come. This was certainly not so in the final proof, for such a palpable error would have been caught by the editor or proofreader. The accident undoubtedly occurred in this way—when the form containing this page was locked up for the press the line dropped out, and the make-up man simply shoved it in anywhere without trying to find its former position. When a man has made a rambling discussion of a paper it is necessary for some one to correct it so that it will look well in print, and this work is done with the very best intention, and for the good of the author, the society and the journal. One important feature overlooked in Dr. Black's report is the matter of illustration. An article properly illustrated interests the average dentist more than one without cuts. Illustrations not only make clear technical points, but are a great addition to our literature.

Dr. F. B. Noyes, Chicago: If an essayist uses models or charts or other things to illustrate his paper, and wishes same to appear when his paper is published, it is his duty to hand to the secretary together with his paper good photographic prints of what he wishes illustrated.

Dr. Black, closing discussion: The omission of the subject of illustrations was intentional, as I discussed it thoroughly last year. I do not know that any considerable improvement has been made along that line this year, but the interest in illustrative work has been kept up. I only wish that the improvement in the preparation of articles during the last ten years had been as great as that in illustrative work.

ARE ALL TEETH EQUALLY SUSCEPTIBLE TO CARIES?

BY HENRI LETORD, D.D.S., EL PASO, TEX.

The idea is widespread that all teeth are equally hard, dense, and resistant to caries. I need not mention names nor cite quotations to prove that this opinion prevails in many and in high places. Neither need I state that the belief is founded upon that wonderful series of papers published by Dr. G. V. Black, dealing with the physical characteristics of human teeth. You are all familiar enough with these facts. It is not the purpose of this essay to report any new evidence bearing upon the question, but to examine critically such evidence as we have already at hand, and if possible to find an answer.

The question has pretty generally been regarded as settled.

Dr. Black, in drawing conclusions from his long, accurate, detailed and scientific examinations of dentin, formulates sixteen postulates, of which the ninth one is as follows: "Caries of the teeth is not dependent upon any condition of the tissue of the teeth, but on conditions of their environment." With a few exceptions the profession has accepted this statement as a proved and settled fact. In his next postulate Dr. Black says: "Imperfections of the teeth such as pits, fissures, rough or uneven surfaces, and bad forms of interproximate contact, *are causes of caries only in the sense of giving opportunity for the action of the causes that induce caries.*" It is my purpose to examine these two postulates in their relation to susceptibility.

In the first place it becomes necessary for us to thoroughly comprehend the factors concerned in caries, and to gain a clear idea of the meaning of susceptibility. The factors of caries must at first be separated into two classes—those of environment and those of tooth structure. These two factors are as separate and distinct as night and day, but they are also inseparably connected. One is unthinkable without the other. One represents a force and the other an object to be acted upon by this force. Just as force is inconceivable except as related to an object, or in other words, to a resistance, and as resistance or an object is inconceivable except as related to a force, just so a tooth's environment (which represents a force tending more or less actively to produce caries) and its structure (which

represents the object acted upon) are inseparably connected in any consideration of dental caries. Although these two factors are so interdependent, each is a separate and a distinct entity, just as force and resistance are distinct, although one can be conceived only in terms of the other.

Regarding a tooth's environment as a force tending to produce caries, and its structure as a resistance to be influenced by this force, let us again turn to our query, "Are all teeth equally susceptible to caries?" Before going further it behooves us to come to an understanding as to the application of the word susceptibility. Webster defines susceptibility as "the capability of receiving impressions." Our question is one of susceptibility to dental caries, and as it is a self-evident truth that the environments of a tooth cannot be the subject of dental caries, it is at once plainly seen that susceptibility to caries is a matter confined entirely to the *structure* of the teeth. Then for our purpose here the environmental factors of decay must be considered as constant, unchanging ones, and the question—"Are all teeth equally susceptible to caries?"—becomes in substance this, "Would all teeth decay equally if subjected to precisely similar environments?"

In seeking an answer to this question we are brought face to face with a consideration of those qualities by virtue of which teeth resist carious influences. Where shall we look for these qualities, in the pulp, cementum, dentin or enamel? The vital and inflammatory theories of dental caries were long ago disproved and it is unnecessary for us to hunt for qualities of resistance in the pulp. Caries of the cementum, if it be primary—that is, originating in and confined to the cementum itself—is in no essential different from caries of bone. If it be secondary—that is, the result of extension of the disease from continuous tissue—it is but slightly different. In either case caries of cementum is a disease of a living, vascular, and ennervated tissue, and there can be no doubt that it is influenced markedly by the elements of vitality. Cementum in which the vitality is great will present a maximum resistance to caries and that in which vitality is small, a minimum one. However, caries of cementum is comparatively a rare disease and almost always is a secondary process. Neither is it the variety of caries which interests us and a further consideration of it is not pertinent to our inquiry.

If the resistance to caries offered by the pulp is of no im-

portance, and if that of the cementum is of but very little more, then those qualities by virtue of which teeth resist carious influences must lie either in the dentin, in the enamel, or in both. Where does decay begin? There is no doubt about the answer—at the outside of a tooth, upon its periphery. In other words, upon the enamel. Now, it is with the beginning of caries that we are principally concerned in studying susceptibility; hence it follows that enamel structure is the chief thing in determining susceptibility. The subordinate part which dentin plays will be considered in its proper place. It is true that where open fissures and pits exist decay may begin immediately upon the dentin, but these cases only emphasize the truth of the statement that enamel is the tissue which must determine susceptibility, because it is in these cases clearly shown that it is through a low enamel resistance, or rather an entire lack of it, that decay gains its foothold.

Thus far we have seen that susceptibility is entirely a question of tooth structure; principally a question of enamel structure, and in less degree a question of dentin structure. Let us now examine susceptibility a little more carefully, and we will see that it is made up of two elements, which are very closely related and interdependent, but distinct enough to make it necessary to distinguish between them. They are: First, ability to resist the beginning of decay, and second, ability to resist its progress after inception. [Note: The truth of Miller's theory of dental caries is taken for granted and the whole argument here contained is based upon this assumption.]

The ability to resist the beginning of caries is entirely a question of enamel structure; the dentin has nothing whatsoever to do with it. Those cases in which decay begins directly upon the dentin, owing to faults in the enamel structure, are not exceptions to this statement, as was pointed out above. By virtue of what qualities then does enamel resist the initiation of the carious process? If these qualities are constant and equal in all enamel, then all enamel is equally resistant to the beginning of caries, and hence all teeth are equally resistant, which is to say, equally susceptible to the beginning of caries, and half the question of susceptibility is answered. On the other hand, if these qualities are not constant nor equal, susceptibility is not a constant, but a variable thing.

Let us examine these qualities. It is at once apparent that they are of two kinds: First, qualities by virtue of which enamel is kept

free from agents tending to disintegrate it. (These are *passive* qualities, qualities of enamel formation, and have absolutely nothing in common with those *active* qualities which tend to keep enamel free from caries by friction, neutralization of acids, etc. These active agents are matters of environment and, as was shown above, have nothing to do with susceptibility.) Second, qualities by virtue of which enamel resists solution in the acids of decay. The truth of the statement that imperfections of the enamel, such as pits, fissures, rough surfaces, atrophied spots, bad forms of approximate contact, etc., are only predisposing causes of caries is universally accepted and justly admitted, but we must not lose sight of the fact that although these are but *predisposing* causes of caries, they are the actual, vital, and indispensable *direct* causes of susceptibility of the kind we are now discussing.

The qualities of enamel by virtue of which it is kept free from disintegrating influences are too well known to need extensive elaboration. They may be summarized as follows: The quality of a smooth, polished surface, which prevents the lodgment of food and fermentable debris as well as the clinging of gelatinous plaques, and the quality of contour, which exposes the maximum of the tooth's periphery to the friction and neutralization incident to mastication and insalivation. If these qualities are present in a high degree in any tooth's enamel that tooth is one of slight susceptibility. If they are entirely lacking or present in a low degree the tooth is one of marked susceptibility. We must therefore conclude that susceptibility is not a constant thing in all teeth but that it varies with enamel formation.

Let us now look at the second kind of enamel qualities, or those by virtue of which the tissue resists solution in acids. At this point we are groping in the dark, because no scientific investigation of this problem has ever been made, or at least has never been generally reported. The extent of our present knowledge of these qualities may be briefly stated as follows—some enamel cuts easily with bur and chisel, some only with great difficulty; hence some enamel is hard and some soft. This statement is not limited to the soft atrophied spots and malformed places found in some enamel, but extends to the relative hardness and softness in well-formed and, as far as the naked eye can tell, perfect enamel. Dr. C. N. Johnson tells us, with every show of truth, that these hard and soft areas

are caused by the arrangement of the enamel rods. Where they lie straight and parallel they are easily cut, like the fibers of straight-grained wood, and where they are twisted about one another and lie interlaced in various directions they are cut only with difficulty, like the knot of a piece of wood. Whether or not this variability in resistance of enamel to cutting instruments has any meaning as regards resistance to solution in acids is an undetermined question. There is no reason, however, to believe that it has, whereas analogy plainly indicates that it has not. Steel, one of the hardest of substances, is easily dissolved by even weak acids, while gold, which is relatively soft, and wax, which is actually soft, are both insoluble in even the strongest single acids. The question of the resistance of enamel to solution can be determined only by experimentation. The probability is, however, that all normally constructed enamel is practically equally soluble. We must therefore conclude that enamel's resistance to solubility in the acids of decay is an unknown, an unimportant and probably a negative factor in the problem of susceptibility.

As regards enamel's ability to resist the progress of decay after its inception there is not a great deal to be said. The time elapsing between the beginning of a cavity and the total destruction of a tooth is a thing of no great moment to us, and in the consideration of susceptibility we are little concerned with knowing whether it is one month or several years after the starting of a cavity before it reaches a condition demanding treatment. Nevertheless we must not ignore the issue lest in neglecting it we should overlook something of importance. Assuredly the only factors which can modify the rapidity of enamel decay after a cavity is started are those coming under the head of qualities by virtue of which it resists solution in acids, since the qualities of smoothness and contour are in the very nature of things at once destroyed when a cavity is started, and all enamel is put on an equality in respect to these characteristics. As was shown above, the power to resist solution is an unknown, though probably a negative element, and all teeth are probably equally resistant in this respect, the difference in the rapidity with which enamel decays after inception being entirely dependent upon environmental factors with which we have nothing to do in this paper. The progress of caries after the enamel is entirely penetrated will be taken up later

under the caption of decay in dentin, where it may be disposed of briefly, thanks to the labors of a brilliant predecessor in this field.

As regards the relation between dentin and susceptibility we cannot do better than to accept Dr. Black's evidence as undeniable proof that all dentin is equally resistant to caries, for his investigations did prove this positively, though they proved nothing else as regards the susceptibility of teeth to decay.

What conclusions are we to draw from all the foregoing? Simply these: First, susceptibility is a matter of tooth structure and not of tooth environment. Second, of the four tissues of a tooth enamel is the one determining susceptibility. Third, all teeth are not equally susceptible. Fourth, susceptibility varies inversely as the smoothness and self-cleansing contour of the enamel. Smoothness means freedom from wrinkles, pits, fissures, rough spots, etc. If any understand this paper to deny the potent influence of environment in the etiology of caries they misunderstand, for the essay denies no such truth, but it does deny environment a place as a factor in susceptibility. If the kernel were picked from this shell it would consist of a plain, simple, well known truth, namely, that malformed, pitted, fissured, rough, poorly contoured teeth are more susceptible to caries than those of a contrary nature. What then is the justification of this paper? Why so much argment and so many words over such a self-evident statement? Simply this—in the discussions of the theory of extension for prevention in particular and almost everywhere in the world of dental literature in general the question of decay is regarded entirely as a matter of environment, while on the other hand, in our practical operations upon teeth decay is treated as a matter of tooth structure only. (Filling teeth is primarily treating them for caries, and secondarily restoring them to usefulness.)

Dental literature is almost barren of any accurate knowledge of the environmental factors in decay of the teeth. Miller has taught us the influence of neglect of cleanliness and the modus operandi of microorganisms, and he is now engaged in publishing his investigations into immunity—a series of articles for which he deservedly has the gratitude of all thinking dentists and from which it is earnestly hoped much good may come. But aside from this and its counterpart in practice, dental hygiene, to my knowledge there has been no effort tending to combat and cure those often obscure factors of environment which cause caries all too frequently in the

mouths of even those patients who make the most conscientious attempts to maintain perfect oral sanitation. If Dr. Black's statement is true, that caries of the teeth is not dependent upon any condition of tooth tissues, but upon the condition of their environment alone, then we are neglecting our duty when we fail to throw much more of our energy into the correction of these obscure factors of environment. If his statement is but partially true we are still negligent.

In fact, no positive statement such as this can be partially true. It must be wholly true or wholly false, and the above statement is false, though it hints at the important truth that environment is a factor of much consequence in dental caries. The fact that fillings and crowns serve a double purpose—in the first place to arrest the progress and prevent the recurrence of caries, in the second to restore disabled teeth to their original usefulness—disguises the fact that when we fill or crown teeth we are primarily and most importantly treating them for caries. Bearing in mind the fact that filling teeth is above all things else treating decay, the fact at once comes home to us that the profession as a whole must spend about ninety-nine per cent of its time treating tooth structure for decay, about nine-tenths of one per cent treating the ordinary environmental factors, uncleanliness and sepsis, and about one-tenth of one per cent treating the more obscure environmental factors. If Dr. Black's statement that caries is independent of tooth structure be true, it is time we were changing our methods of treating decay. On the other hand, if tooth structure does play the important role which this analysis seems to accord it, then it is time for us to give it the recognition it deserves in our literature even as we now unconsciously do in our practice.

It is not my aim to call attention to the simple fact that imperfections of enamel structure do cause a variable susceptibility of teeth to caries, but to emphasize the fact and to give it its proper position in our literature, for its recognition is of the utmost importance. It is the very foundation of our work and the principal source of our income. It is true that many educated (dentally speaking) patients seek their dentist's aid for the purpose of conserving the usefulness of their teeth, but a great number also seek him almost entirely for the sake of having decay treated mechanically in order that they may escape pain. In reality both environmental and structural factors are of prime importance, and the truth

is done an injustice when either is slighted. We cannot be unfair to the truth without blocking the path of our profession's advancement, which surely we do not wish to do. If this paper has clearly drawn the line between the two elements concerned in dental caries: the one, the causative elements embraced in the tooth's environment, the other, the resistant elements embraced in the tooth's structure, and if it has shown that the first of these is not concerned in the problem of susceptibility, and that the second, which controls susceptibility entirely, is variable, and that consequently all teeth are *not* equally susceptible to caries—if it has done these things it has served its purpose well.

THE DENTAL PULP, VIEWED WITHOUT THE MICROSCOPE.

BY THOS. E. CONSTANT, M.R.C.S., SCARBOROUGH, ENGLAND. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, MAY, 1903.

The majority of observers have given most attention to those points which require the microscope for their elucidation, and it is partly on that account that I intend to-day to confine myself to the macroscopic aspect of the subject. The human dental pulp has been arbitrarily defined by an American writer as commencing during the fourth month of the fetal existence. Prior to that time it is the "dental papilla." This distinction is convenient, and although I am ignorant as to whether it has met with general acceptance in this country, for the purposes of the present paper I shall adopt it. At the end of the fourth month of fetal existence dissection reveals the pulps of the deciduous teeth as translucent gelatinous substances, which roughly correspond in shape to the crowns of the teeth which are respectively formed from them. They are generally described as lying in a shallow groove or gutter of bone which is all that exists at that period of what is later known as the alveolar portion of the jaws. The pulps are severally surrounded by a membrane to which they are not anywhere adherent except at their bases. Between the investing membrane and the pulp there is always a fluid which John Hunter likened to the synovial fluid in joints. In the case of the lower animals this fluid is often found in considerable quantity. The membrane

is of course the tooth-sac. What the fluid is I do not know. By stripping the periosteum from the jaws the tooth-sacs and their contents can be removed entire from the gutter of bone in which they lie. At this period (fourth to fifth month), when the dental sacs have been thus removed the groove in which they lie is found to be traversed in the incisor region by slight ridges, which form the commencement of the alveolar septa between the incisor teeth. On opening the tooth-sacs they are found to be adherent below to the tooth-pulps and above to blend indistinguishably with the oral mucous membrane. The apices of the pulps show signs of commencing calcification, the incisors being tipped with little caps of bony material. As calcification proceeds these caps gradually increase in thickness and extend downward over the sides of the pulps, and at the end of nine months of fetal existence the central incisors are about two-thirds calcified; that is to say, the edge of the calcified caps almost reaches the bony floor upon which the pulp rests. In the meantime the bony gutter has undergone a marked transformation. Its edges have grown up around the pulps and the transverse ridges already mentioned have also grown up, forming complete septa between the developing incisor teeth. In the same way the pulps of the developing cuspid and molar teeth have been enclosed, bony septa of which there was no indication at four months having sprung up. Thus each developing tooth has become enclosed in a separate crypt, the floor of which is formed by the original gutter of bone, the labial and lingual walls by the upgrowth of its edges, and the mesial and distal by the upgrowth of the bony septa. Most of the text-books state that it is about this time (nine fetal months) that a roofing in of the crypts takes place by an arching over of the walls.

Thus Broomell writes in describing the development of the crypts: "Beginning with a simple groove or gutter, into which the tooth follicles hang, the follicles exerting a controlling influence over its form. Next comes the appearance of septa between the anterior follicles, which at this period are somewhat irregularly placed in the arch, followed in a few weeks by a well-defined partition between the cuspids and molars, until finally at birth each follicle is enclosed in its individual crypt, with the single exception of the second molar, in which the distal septum, or that which is to separate it from the first permanent molar, has not yet made its

appearance. As the tooth follicles increase in size, by the development of the teeth within, they become more perfectly enclosed in the bony vaults, the sides of the alveolar walls arching over and almost completely enclosing the developing teeth."

Tomes, speaking of the condition of the mandible at the time of birth, quotes: "The alveolar margins are deeply indented with large open crypts." As a matter of fact, both of these descriptions are incorrect, for in the nine months' fetus and at birth the crypts are completely closed. It is true that the bone which forms the roof of the crypts is very thin and parchment-like, but it is always there. Broomell is wrong, too, in his description in so far that he makes it appear that the roof is formed very late and by an arching over of the walls. The roof, such as it is, is complete before the bony septa between the various teeth, and what is usually described as a groove or gutter is really a tunnel with a very thin bony roof. There are one or two specimens in the museum of the Odontological Society of Great Britain which illustrate this very clearly. At birth, then, the dental pulps and their partially calcified crowns are completely enclosed in bony crypts. In any dry specimen in which this bony roof is found complete the external surfaces of the calcified crowns within the crypts are invariably found to lack the lustre and vitrified appearance one finds upon the surface of adult teeth. In a crypt from which the roof has been partially or wholly absorbed the tooth-crown is found to be completely calcified; from which we may, I think, infer that completion of the process of amelification is the necessary prelude to absorption of the roof of the crypt. At the time when this absorption occurs the bases of the crowns are in closer contact with the floors of the crypts in which they are contained than at any other time, but there always intervenes, of course, the vascular tissue which marks the junction of the tooth-sac and the pulp.

It is in the unfamiliar character as the active agent in the translation of the teeth from the crypts in which they originate to the position they finally occupy in the mouth that I wish you to make the acquaintance of the dental pulp to-day. To do this it was first necessary to remind you of its anatomical relations, which have been altogether ignored by the authors of the various theories which from time to time have been advanced to explain that interesting developmental process which we term "eruption of the teeth."

Before stating the case for the dental pulp let us pause a moment to consider these theories. One of the oldest of them is that the eruption of the teeth is due to the elongation of their roots. As long ago as 1835 Thomas Bell wrote: "As ossification proceeds the roots of the teeth continue to elongate, until first those of the incisors and subsequently the others can no longer be contained within the alveoli." This theory is still very popular, but against it the following insuperable objections have been raised: First, that the distance traveled by the crown of the tooth is sometimes greater than the length of its root. Second, that teeth with comparatively little root sometimes erupt, whilst others with fully-formed roots remain unerupted. Third, that teeth with roots fully formed may remain unerupted for some length of time and then subsequently erupt. The following quotation from an article by Dr. Peirce (1887) clearly shows that there are some writers who even yet regard this theory with favor. He says: "The absorption of the superimposed tissue from the advancing crown and the elongation or growth of the root by an increase in the pulpy mass or formative tissue and its calcification are the progressive developmental processes which we term 'eruption of the teeth.' * * * The force by which the teeth are propelled towards and through the mucous surface into position is thought by many to be something in addition to that indicated above as the result of normal growth."

In explanation of the eruption of teeth with unformed roots, Dr. Peirce writes in the same article: "The question at once arises whether such premature presentation of the tooth-crown is not wholly due to an absorption or wasting of the superimposed tissue, rather than to the elevation of the crown, which could not well take place without the growth of root, unless it were from the contraction or an expulsive effort of the tooth follicle." The same writer offers the following ingenious explanation of the eruption of teeth with roots that were fully formed some time previously: "There is a mechanical force, however, acting on all such teeth, tending to bring them to the surface, the same as on an unantagonized tooth, inducing its elongation or protrusion from the socket. The repeated closing of the jaws must exert to a large extent this mechanical force, just as the bung in a barrel is elevated by a blow being struck upon the stave or either side of it."

Tomes' explanation of the same phenomenon is not quite so ingenious, but as will appear later is not less unsatisfactory. His account of the eruption of a cuspid tooth of a human female at the age of forty-five is as follows: "Supposing it then to be admitted that the tooth was completely developed before the process of cutting commenced, the process in itself must be in some respects different from that which occurs when teeth are cut under ordinary circumstances. When the process is normal as respects time and the stage of development of the tooth the crown appears through the gum long before the root has attained its full length. The crown is in great part brought towards the surface of the gum by the progressive lengthening of the root, and is afterwards still further raised by the same process. Now, when the eruption is accomplished subsequent to the development of the root, the movement of the tooth must be effected by some other means than by the progressive lengthening of the root. The completed tooth has to change its place without itself undergoing any change. The bone which stands in its way must be absorbed, and the lower portion of the socket from which the root of the tooth emerges must be contracted by the deposition of the bone. Indeed, in the absence of a better hypothesis it may be assumed that the gradual contraction of the socket is the means used by nature for bringing teeth to the surface when the process of eruption has been delayed beyond the normal period. In the one case the movement is effected by the development of bone within the alveolus, in the other by the progressive development and consequent lengthening of the tooth."

Another theory that for a time held sway was that of Delabarre. The following account of it from Harris' "Dental Surgery" (1863) is almost touching, and shows the fascination it exercised over lovers of analogy: "The able physiologist and learned dentist, Delabarre, has advanced a most ingenious theory upon this subject. He believes that the passage of a tooth through the gum, or rather its escape from its crypt, is effected in precisely the same manner as is the birth of a child. He regards the sac attached above to the gum and below to the neck of the tooth as the chief agent in the eruption, and believes that it is by its contraction that the latter is raised from the bottom of the alveolus and ultimately forced through the dilated orifice of the capsule and gum. This is the most rational theory that has been advanced; it explains upon principles of sound

physiology this most wonderful and curious operation of the economy." This romantic theory lost favor chiefly because its most ardent supporters were unable to demonstrate the slightest resemblance between the dental sac and the female organ to which they imagined it was analogous. It would not have been included here were it not that a passage in one of the above quotations from the writings of Dr. Peirce indicates that the theory has not yet lost its pristine power.

It must have been the improbability of Delabarre's theory that encouraged Coleman to propound another, the acceptance of which would involve the abandonment of existing views as to the growth and development of the jaws. He imagined the teeth to be carried to the surface by a series of "bone currents," in other words, by interstitial growth of bone peculiar to the jaws, and then laid bare by the absorption of the alveolar margins. The reluctance displayed by our leading physiologists to lay aside their views as to the growth of bone and to accept Coleman's no doubt largely accounts for the modified enthusiasm with which his theory has been received. Perhaps the greatest objection to it apart from this is that while it accounts more or less satisfactorily for the eruption of the teeth, it fails to explain how it is that some teeth never do erupt. It is difficult to imagine a lateral or cuspid tooth stemming the tide of bone-currents that its immediate neighbors have found it impossible to resist.

Another theory is that the teeth are raised by a deposit of bone at the bottom of the crypts in which they are contained; and yet another (which is the last to be considered here) is that the teeth are forced into their destined places by contraction of the alveoli. Of these two theories, the latter would account only for the eruption of such teeth as have a single conical root, because in the case of teeth with two or more roots such contraction would tend to retard rather than assist eruption; while the former rests upon an assumption for which, as we shall presently see, there is absolutely no foundation.

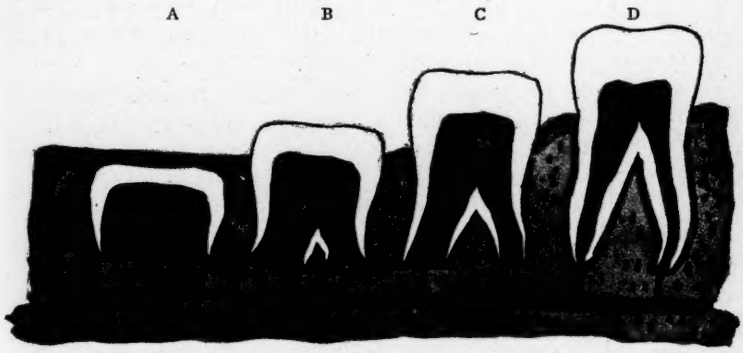
I would here draw your attention to a diagram which represents a specimen in the Museum of the Odontological Society of Great Britain. It shows as clearly as possible that the distance of the bottom of the crypt containing the second molar from the interior dental canal is very little less than the distance of the apices of the

roots of the first molar from the same landmark. It is therefore clear that the eruption of the first molar could not have been due to bone deposition upon the floor of its crypt. Reference to the same illustration will also convince you that narrowing of the alveoli containing the roots of the first molar would have retarded rather than assisted its eruption.

It appears to me that the chief objection to the root-elongation and bone-formation theories is a physiological one. It is extremely difficult to conceive such a process as dentin-formation exercising independent mechanical force. But granting that it may be so, upon what structure is that force exercised? in other words, what does the root "shove" against? Since the forming root is never in actual contact with its bony surroundings, it must necessarily be against the vascular material in which it is embedded. Now this tissue appears post mortem of far too jelly-like a consistence to oppose any effective resistance by virtue of its own structure, and yet such resistance there must be or the tissue would be obliterated. Whence, then, are its resisting properties derived? Necessarily from the blood-pressure. Assuming therefore that the physiological process of dentinification *can* exercise independent mechanical force and *is* a factor in the causation of eruption, it must, since action and reaction are equal and opposite, divide the honors with the blood-pressure—a factor hitherto quite unrecognized. Indeed, it is obvious that any *vis a tergo* must act through the vascular material surrounding the root, and it follows that such force cannot be greater than the blood-pressure or it would cut off the blood-supply to the root.

But is a force other than the blood-pressure a necessary hypothesis when we consider the exceptionally advantageous conditions under which it acts? Let us illustrate these conditions by a diagram. A, B, C and D represent a section through a lower molar tooth and its crypt at various stages of development. In A it is obvious that the pulp forms a fleshy column of vascular tissue upon which the crown really rests. The pulp itself is injected by the force of the blood-pressure entering almost directly from A′, an artery of considerable size. Under the calcifying margins of the crown is the pad of tissue that forms the junction of the sac and pulp, and between the crown and the walls of the crypt is the vascular tooth-sac which is injected from the same source as the pulp.

Above the crown is the oral mucous membrane and submucous tissue. Now it is obvious that the blood-pressure exerted in the pulp-tissue acts upon the crown at a considerable mechanical advantage in comparison with the pressure in the tissues overlying the crown. Indeed, it is only necessary to glance at the diagram to understand how it is that some teeth travel so quickly to their destined position when once their crowns have emerged from the gum. In fact, with regard to this point, it is a marvel that dentists who have had many opportunities of observing the rapidity with which teeth sometimes move during eruption should ever have been induced to regard the comparatively slow process of dentinification



Section through a lower molar tooth.

as the active agent in the matter. As eruption proceeds so does root-formation, the former making space for the latter. Indeed, the mechanism is somewhat similar to that employed by a sweep in cleaning a chimney. Perhaps I had better explain that our sweep in England employs a circular brush and a bundle of rods with screw joints. He places the brush in the chimney and screws in the first rod, then pushes the brush up the chimney the length of the rod and screws in another rod, and so on. Now, the sweep represents the pulp, the force he uses to push the brush up the chimney represents the blood-pressure, and the screwing in of a fresh rod represents the various stages of root-formation.

Referring again to the diagram, we notice that each stage in the

formation of the root diminishes the extrusive tendency of the pulp, until when the root is complete it becomes practically *nil.* Moreover, after the tooth-crown has emerged from the gum the tooth-sac, which has now become the peridental membrane, forms a ligament for the tooth, being attached both to the roots and to the socket. The vascularity of this membrane still endows it, however, with an extrusive tendency which is in itself sufficient to account for the gradual elongation of unopposed teeth, and is probably the chief means by which the proper occlusion of opposing teeth is maintained. If we have any doubts in the case of healthy teeth as to whether this elongation is due to the normal blood-pressure exerted in the peridental membrane, they should surely be dispelled by the clinical phenomena that present themselves when the blood-pressure is pathologically augmented; in other words, when inflammation of the peridental membrane supervenes. When we consider the mechanical conditions illustrated by the foregoing diagram in conjunction with the pulsating and expansive force exercised by the blood-pressure, does not the necessity for another eruptive force disappear and Dr. Peirce's bung-and-barrel explanation of the elongation of unopposed teeth become somewhat superfluous?

If we assume that the blood-pressure, acting in the manner above described, is the sole active mechanical factor in determining the eruption of the teeth, will it account for the phenomena other theories fail to explain? That the crown of the tooth sometimes travels a distance greater than the length of its root, that teeth sometimes erupt subsequently to the formation of their roots, and that teeth with comparatively little root occasionally erupt, are facts all in favor of such hypothesis and can be explained by it. The fact that teeth with fully-formed roots remain unerupted can be more easily explained by this theory than by any other, because it alone can account for the space obtained for the fully-developed roots which often occupy abnormal positions. In other words, the blood-pressure acting as it does equally in all directions makes room for the developing root in the direction of least resistance. Normally this is in the direction of the advancing crown, but occasionally it is elsewhere. The continuous eruption of teeth with persistent pulps, which neither Delabarre's nor Coleman's theory

could possibly explain, is a very simple problem if we admit the blood-pressure as the active mechanical factor. I am therefore of opinion that upon anatomical and physiological grounds alone are we justified in assuming that *the blood-pressure exerted in the vascular tissue which lies between a developing tooth and its bony surroundings is the active mechanical factor in the process known as the eruption of the teeth.*

So far the purely mechanical aspect of the question has been alone considered, but if your patience will endure the strain there are one or two points of physiological interest which have so direct a bearing upon the subject that it would be as well to include them here. Some years ago I recorded the observation that in young people when a back tooth had lost its antagonists the characteristic elongation which took place under those circumstances varied in cases in which the pulps of the unopposing teeth were dead from those in which they were living. In the former instance, although the elongation of the teeth took place, it was unaccompanied by any downgrowth (or in the case of a lower tooth upgrowth) of the alveolar ridge; whereas in the latter case there was a corresponding deepening of the alveolar ridge. In other words, in the case of dead teeth there was simply extrusion from the alveolus, but in the case of living there was growth of the alveolar ridge. It therefore appears obvious that the growth of the alveolar process is dependent upon the integrity of the dental pulp; or in other words, that the pulps of the teeth as a whole exercise a trophic influence with regard to the alveolar process. I am of opinion that extirpation of the pulp of a tooth causes a marked and permanent alteration in the vascular condition of the peridental membrane; in fact, a disturbance of vasomotor equilibrium in the direction of a paralysis of the vasoconstrictor mechanism.

The foregoing remarks apply to both the permanent and temporary dentitions, but the pulps of the temporary teeth exercise another kind of trophic influence which seems to have escaped the notice of dental writers, namely, their influence upon the process of resorption of the roots of the temporary teeth. In the case of temporary teeth in which the pulps are destroyed at the time when resorption of the roots should commence, resorption strictly so-called does not occur at all. In such cases a certain amount of absorption of the root takes place as a rule, just as it often does in the case of

dead permanent teeth, the macroscopic appearance of the roots in both cases being strikingly similar. This absorption is a pathological process and differs markedly from the physiological process of resorption. It is a much slower process, and that is one reason why we so frequently find the apices of the roots of dead temporary teeth protruding from the labial or buccal surfaces of the alveolar ridges, causing that ulceration of the mucous membrane of the cheeks or lips with which we are so familiar in the case of children whose deciduous teeth have been neglected.

The explanation of this common phenomenon is simple. The death of the pulp of the temporary tooth has left its root incapable of resorption and its socket prone to degeneration. Absorption is too slow a process to make room for the crown of the permanent successor, which soon impinges upon the dead root, deflects it, and thrusts its apex through the degenerated alveolar process and the superjacent soft tissues. In those cases in which death of the temporary tooth has taken place some time after the process of resorption has commenced, and the root is in consequence shortened, the pressure of the advancing permanent tooth simply tilts the root until it takes a nearly horizontal position, the crown, if any remains, being correspondingly deflected. Other phenomena which admit of a similar explanation are familiar to us all and need not be enumerated.

From the time when the dental pulp is "nothing more than a part of the mesoblastic myxomatous tissue of the jaw, which has become more rich in vessels and cells than the other neighboring part," up to the time when commencing senile degeneration presages the termination of its physiological activity, it is one of the busiest exponents of local government observable in the whole domain of human physiology. While it is hard at work constructing the tooth it regulates the blood-pressure that causes that organ to travel to its appointed place in the mouth, at the same time building up the bony walls that enable that pressure to act at a mechanical advantage. Then in the case of the temporary teeth it superintends the demolition of the very structure it has been at such pains to create; and finally in the case of the permanent teeth it controls the nutrition of those parts upon the integrity of which the tooth is dependent for the proper exercise of its function.

THE VELUM OBTURATOR.

BY C. S. CASE, D.D.S., CHICAGO. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT BLOOMINGTON, MAY 12-14, 1903.

At the last meeting of the National Dental Association I presented a paper, which was published in the DIGEST for January, 1903, p. 48, illustrated with drawings and models, describing a new form of soft rubber artificial palate for congenital cleft, and now, after having had a more extended opportunity to judge from a practical standpoint of the value of its peculiar form when made hard and used as an obturator, I am more than ever anxious to bring it before the profession, with the hope that the entire modus operandi of its construction and application will one day become as familiar to dentists as other things in their practice.

In its first or flexible soft rubber state its form is better calculated than the Kingsley velum to enable the patient to *completely* close the naso-pharyngeal opening, because instead of the borders of the veil—or pharyngeal portion—being thinned to a feather edge, with the intention of having them yield to the slightest touch of the muscles, the borders of my palates are thickened to a roll or three-cornered mass which is exactly fitted to a zone of the pharyngeal walls when the muscles are in a contracted state; and, being more or less unyielding, it presents to the muscles a stability of contact surfaces that has been one of the principal advantages of the hard obturators, and especially the very admirable and ingenious hard rubber obturator which was introduced by Dr. Grant Molyneaux.

As you will see by a variety of palates which I have placed on the models of respective cases for your inspection, and also in the mouth of one patient who has kindly consented to be present, the thickened portion of the veil is only at the very border, the central or intervening portion being thin and light as rubber dam.

These palates possess another advantage over the Kingsley velum, as follows—it is a well-known fact that soft rubber when worn in the mouth is subject to early deterioration. This is especially true of the thin borders of artificial vela, which having once lost their natural elasticity maintain a wrinkled or curled-up position under the constant action of the muscles. This unfortunately has been one of the greatest objections to the Kingsley palates, causing them to lose their usefulness as an artificial organ of speech so soon as the borders

became so curled that they ceased to permit contact with the pharyngeal walls.

In the use of these palates it has been my practice to gradually thicken the veil and extend supporting ribs on the upper side to the thin borders. In this way I have succeeded in prolonging their usefulness, though it greatly increases their heft and detracts from their proper action.

I do not wish to be understood in this paper as attacking the Kingsley velum, nor in any way detracting from the honor and praise that is due to its very eminent and ingenious author. On the contrary, I am pleased to say that I consider it one of the great discoveries of the dental profession, and one that has restored speech and advantages of citizenship to hundreds of beings who could have received no aid from the most skillfully performed surgery.

After using that method for over twenty years successfully and with the greatest satisfaction as a specialty of my practice I think I am qualified to know and appreciate its merits and demerits, and I feel confident in saying that in every instance where it has proven less than a fair success it has been solely because the principles of its form and construction were not skillfully carried out, or because the patients did not give the aid it was possible for them to render. In the *Cosmos* of July, 1885, I published a method for constructing the Kingsley velum which was illustrated with about twenty cuts. To-day I am using essentially the same method in the mechanical construction of my new palate.

The shape of my present flask is somewhat different, but the principal features are the same. I now use investing-plaster models within the flask for casting purposes instead of sand, and the models and final casts are separated at more convenient points for the removal of the vulcanized palates. Those who are interested in this branch of the work will have an opportunity at the clinic to see a plaster impression taken of an extensive double cleft. Afterwards I think you will agree with me that the operation of taking an impression for an artificial palate, even to perfect accuracy of the borders and floor of the nares, is one which requires no more skill and produces no more discomfort to the patient than the taking of an impression for many partial dentures. You will also have an opportunity to examine in complete detail the methods of constructing an artificial palate.

Dr. Kingsley's practice of keeping on hand a variety of palates of different sizes and forms, for the purpose of supplying dentists who essayed to construct cleft-palate apparatuses with vela which no more than approximated the shape and size of those required for the particular cases, has, in my estimation, done more than anything else to injure the reputation of the Kingsley method.

I have always maintained that it is quite as necessary to make a special palate for each case as to make individual dentures of any kind, and that for each patient individual casts should be made, in which new palates could be easily vulcanized, and mailed to any part of the world on order, when the first ones had lost their usefulness through deterioration of the rubber.

Drs. Kingsley, Ottolengui, and others, as well as myself, who have made a practice of inserting the flexible rubber palates, have always advised changing them later in life for a metal or hard rubber obturator. Yet the instances are very rare where this has been done, principally because it involved another complete operation considerably different from the first, with added fee, etc. In some instances, where an attempt was made to change the Kingsley vela for hard rubber obturators, made after the Molyneaux pattern, the patients would not wear them, because the shape and conditions were entirely different, and there was consequent irritation of the tissues. They insisted upon continuing with the original vela, which gave them no discomfort, and when new and perfectly formed enabled them to speak with the most satisfying results.

The question then arises, if the hard rubber or other so-called obturators are ultimately superior, why not make them in that way at first? To say nothing of the extra irritation to exceedingly sensitive tissues which a hard rubber or metal obturator would at first produce, even if absolutely correct in form, those who have had considerable experience in fitting artificial palates well know how difficult, and in most instances impossible it is to make one that does not require considerable change in form before it is correct: First, to relieve irritation to the tissues, and second, which is far more important, to build it out or cut it down here and there for purposes of more perfect vocal articulation. If made of soft rubber within metal casts the operation is a perfectly painless one, and the first palate can usually be worn without irritation or special inconvenience.

Changes in the size or form of subsequent palates can then be easily made by changing the metal casts in which they are vulcanized.

This brings us to the title of this paper, "A Velum Obturator." Dr. Ottolengui, who opened the discussion on my paper at the meeting of the National, said: "I had always thought until to-night that it would be necessary for those who treat these cases mechanically to decide between a hard rubber obturator and a soft rubber velum, but Dr. Case has brought us a new appliance. He states that it differs essentially from the Kingsley velum, and it certainly does, not only in form but in action and every feature. Of course it is not a hard rubber obturator, but I consider it an obturator rather than a velum. . . . If it is an obturator, why should it be made of soft rubber? The soft rubber would not be so durable as the hard, and hard rubber obturators can be made to serve every purpose. The only advantage of a soft rubber velum over an obturator seems to be that it enables a rapid progress in the acquirement of speech, but later in life, perhaps at the time when the patient needs a new instrument, in any event speech having been perfected, it is usually preferable to make a hard rubber appliance, which will be permanent and more cleanly than one of soft rubber. Thus the obturator apparently comes into use after the patient has been educated to speak by means of the soft rubber appliance, which should in every sense of the word be a velum. However, in many instances an obturator can be inserted at the outset with very beneficial results." When Dr. Ottolengui made these remarks he little thought that his words were prophetic of a coming ideal artificial palate that would be in perfect accord with his ideas, and although I did not mention it at the time, because the completed principle which I am now prepared to lay before you was then untried, practically, a few friends knew of my hopes.

This artificial palate, as Dr. Ottolengui says, has the form and characteristics of an obturator, and yet it is one which can at first be made of soft rubber, vulcanized within metal casts, and if it is properly formed, according to the method and principles I have fully described, it presents to the patient and operator all the advantages of a soft rubber velum. My experience has taught me that the principal advantage of a soft rubber palate that has been vulcanized in metal casts, is not that it can be worn with greater comfort from the start, nor that it enables the patient to more readily

acquire perfect speech, though these are important, but it is because it admits of a ready change of form and the proper development of the palate—by changing the metal casts—until you have reached a form that is exactly suited to the demands of the surrounding tissues for the acquirement of perfect speech and resonance.

When this has been accomplished my present method admits of easily changing our soft rubber velum to a hard rubber obturator, by simply packing the same casts with hard vulcanite instead of soft. The fact that this change can be made without subjecting the patient or ourselves to another complete operation, and also that the hard rubber obturator is exactly the shape of the original velum to which the patient has become accustomed, are features of considerable importance. Again, this change can be made gradually by packing a portion of the casts with hard vulcanite and the balance with soft. It is my custom to make the first ones with the body or palato-nasal portions of hard rubber and the veil of soft. This will not subject the sensitive pharyngeal and palatal tissues to a too sudden change.

A favorite method will be to make the thin central portion of the palate of gold plate, rolled hard, to No. 38 or even 40. This plate is cut the proper size, to permit of its edges extending partly into the roll forming the border of the veil, then its edges are roughened or punched, and the plate is laid in its place in the cast, while the rubber is packed around it. If the border of the veil is made of soft rubber and the central portion of gold I have no doubt it will last for years without harmful deterioration. This would permit a slight elastic movement of the veil that is always desirable.

Before closing this paper I should like to say a few words in regard to the form of the veil or pharyngeal portion of the palate as an instrument calculated to fulfill the demands of an obturator. Those who have read my National paper will recall my method of obtaining a guide for the position and shape of the border of the veil, which is intended to fit along a narrow zone of the pharyngeal walls, when the muscles are in a contracted state, thus enabling the patient to close the naso-pharyngeal opening by contracting the muscles. The path of this zone, which practically should extend from the lateral attachments of the velum palate on either side back across the point where the superior constrictor of the pharynx presents its greatest extension, is carefully chosen to avoid impinging upon the

Eustachian openings, and to obtain the most active possibilities of the muscles.

The object of this is to give the greatest possible aid to the muscles, principally the superior constrictor, in the act of completely closing the nasal opening in producing the enunciatory parts of speech and oral resonance, and then to be immediately followed or preceded by the largest possible opening when the muscles drop back to take a position to form open resonating tones. It will be seen by this that the relative position of the border or contact surface of the veil should be only that which is consistent with the possibilities of the muscles to completely reach it, in order that the power of freely throwing the tone into the sounding-board of our vocal instrument, which is quite as essential to perfect speech as oral resonance and distinct enunciation, will not be diminished. Furthermore, I can see no reason why the pharyngeal surface of the border of the veil should be any wider than necessary to permit a stability of muscular contact, or the central intervening portion be thicker than necessary to stop the air. If the latter is a thin plate of rubber or metal valuable resonating and nasal breathing space will not be obstructed above.

The velum-obturator taken therefore in its entirety, together with the principles of its construction and application, seems to me must appeal to every thinking mind as along the lines of science and practicability. When used as a velum it is certainly superior to the Kingsley velum for reasons which I have given, and as a hard or partially hard obturator I do not see how its form could be improved.

As highly as I regard the Molyneaux obturator, and appreciate the remarkable success which he claims for it, I have always believed that it spreads out upon the pharyngeal walls to a needless extent. And if it covers or in any way obstructs the Eustachian tubes, causing a thickening of the mucous membrane around these orifices, which rubber frequently does, I should imagine that it would ultimately affect hearing to such an extent as to interfere with the function of this branch of the auditory apparatus. I do not wish to be understood as claiming that it does this, because I do not know, never having seen one of these obturators in actual use, but to me its form is objectionable, because it occupies valuable space that should be as nearly as possible like the normal conditions—open and uncovered, for the free passage of air and open resonating tones.

Discussion. *Dr. B. J. Cigrand,* Chicago: Dr. Case calls his apparatus an obturator, and this is practically what it is, but that is not a good word because it means the closing up of an orifice, and this device only partially closes it up. Anything which entirely closed the opening would be a hindrance rather than an aid. It is evident that we need some new terms to express just what we mean. The results that Dr. Case has secured with this method are remarkable. I was agreeably surprised to see with what ease his patients handle these obturators, and how distinctly they speak with their aid. The Kingsley palate hangs on the tongue and is only a temporary affair. It is very porous and naturally takes up the secretions of the mouth, so that when it is removed a disagreeable odor manifests itself. It disintegrates in a short time, and its sharp and thin margins of velum rubber are a detriment. Surgical procedures are not to be compared with Dr. Case's method, although a number of surgeons are advocating operation when the child is two or three months old. Surgery gives only a partial restoration, which never becomes permanent, because no surgical method will cause the walls to come together and heal so as to close the cleft. The spring and hinge for soft palate are disagreeable and unscientific, as the spring becomes clogged up with food. Springs should not be used in the mouth except temporarily in cases of orthodontia. Velum rubber fastened to a plate by a spring is not a success and the patient's health is jeopardized by having such a thing hanging in his mouth. The only suggestion I would make as regards Dr. Case's appliance is that pure gold is more desirable for direct contact with the soft tissues than rubber, and if this obturator could be made of pure gold or of rubber covered with pure gold it would be an improvement. If this cannot be done I would suggest that the whole thing be made of cast aluminum.

Dr. Gilman T. Smith, Princeton: The first appliance of this sort that I constructed was in a case where the palate was cleft to the front; the central and lateral incisors were missing, and the opening was a large one. I took an impression of the mouth in modeling compound and cooled it thoroughly, then warmed the upper part that extended into the opening, and inserted the impression again and compressed so as to make it as perfect as possible. Next I constructed a plate with the under side of hard rubber and the upper of soft. I trimmed the impression to approximate as closely

as possible the thickness of the opening, and the plate was so made that the part which extended into the opening was broader by about one-fourth of an inch than it was in the hard places where the opening was next to the bone. I attached two teeth in front, and the soft palate behind extended down about an inch back of the hard palate. That was thirty years ago, and the same appliance is doing service to-day, but minus the soft palate part. Another case was that of a young lady with partial cleft who had been operated upon five times without success. The opening was about three-quarters of an inch in width and length. I constructed a soft rubber button with a flange about a sixteen of an inch thick, extending a fourth of an inch each way over the opening. I have made a number of these buttons which have been used successfully for several years. So far as speaking is concerned, I never saw a device that produced perfect articulation, and I do not believe one can be made.

Dr. C. P. Pruyn, Chicago: It has been a source of great pleasure to me to be called to Dr. Case's office from time to time to see patients who were wearing this obturator. The patients were of all ages and the clefts were of all shapes, but satisfactory results were uniformly attained. His method of taking impressions is unique. Taking a spatula about as large as a good-sized cement one, he puts a little soft plaster into the cleft on one side and then a little on the other side, alternating until the whole cleft is covered and closed in, with the edges slightly overlapping. Then he trims off the edges, leaving a clearly defined narrow border, and takes an impression of the mouth over the cleft impression. The two impressions are removed readily and separately and are as nearly perfect as may be.

Dr. Carl T. Gramm, Chicago: Does the area over which the plaster is spread include the soft velum or is it confined to the hard palate?

Dr. Case, closing discussion: I make no attempt to take an impression of the soft palate or the pendant portion of the bifurcated velum palate, because even plaster mixed thin and pressed against these movable tissues would naturally raise them. Furthermore, the slightest touch would cause the patient to draw them back and away from their normal positions. I am glad that Dr. Cigrand has become converted to my method, as he has been specially inter-

ested in this subject and has made many attempts to construct special forms. I would modify Dr. Pruyn's description a little, especially in one particular. He rather intimated that the first mix of plaster was brought down below the nearest approaching borders of the cleft and lay somewhat upon the lingual portion. If that were true, and I allowed it to harden in that position, it would be difficult in most cases to get the piece out of the mouth without breaking it up. By using a spatula I am able to force the plaster into the cleft and over onto the floor of the nares on either side, for the purpose of securing a perfect impression above the border of the cleft and along the floor of the nares. The object of this is that when the palate is made to conform to that shape, fitting perfectly along these borders and onto the floor, it frequently holds itself in position without other means of support. When the first mix of plaster is brought down to the nearest approaching border of the cleft it is scraped away along the edges until no part of it laps upon the lingual portion of the cleft. The exposed portion of plaster should then be lubricated with vaselin. The next mix is put on with the spatula in the same way so as not to raise the piece from its lodgment. Finally, the balance of the plaster is put into a cup, flattened out in its middle portion, and carried to place, but with no intention of taking a full impression of the teeth, but only the lingual portion of the mouth where you desire to have the lateral extensions of the artificial palate. Consequently this portion of the impression is easily removed. You need have no fear in removing the plaster that was forced above the cleft, even if it has been forced up into the nares far enough to secure an impression of the inferior turbinated and vomer surfaces. It should be carefully teased away from its attachment and moved back into the larger space, when it can be easily removed from the mouth and placed in position on the other portion of the impression.

SENSITIVE DENTIN.—Jarring the tooth with an automatic mallet, having a blunt-point plugger in the cavity, aids materially in inducing the penetration of fluids into the dentin.—N. C. LEONARD, *Headlight.*

SENSITIVE DENTIN.—In cavities where the dentin is sensitive I take a pledget of cotton, thrust it into the spirit lamp and let it ignite, and while hot place it in the cavity and leave it there. I find that in many such cases I can cut sensitive dentin very much better after this treatment.—DR. AUSTIN, *Era.*

Digests.

FILLING TEETH WITH NON-COHESIVE GOLD, TIN, AND TIN-GOLD. By J. R. Clayton, D.D.S., Shelbyville, Ind. In filling with cohesive gold about nine-tenths of the labor is expended in building a solid chunk of gold in a hole, and the other tenth in placing the gold against the wall of the cavity in the attempt to accomplish the sole purpose of the filling, namely, to hermetically seal the cavity against the ingress of the agents of decay, for it is evident that if this be accomplished the matter of the solidity of the body of the filling is one of but little concern. If we fail to do this the work is all a failure; no matter how well the gold may have been welded, the purpose of the operation has not been attained and is not worth the time and expense of putting it there, to say nothing of the discomfort of the patient in undergoing the operation. In filling with soft gold, tin, and tin-gold, the force, until the cavity is filled, is all expended against the cavity wall, and in condensing the material expands laterally so long as the force brought to bear upon it is greater than the resistance, for it must be borne in mind that the material does not become stubborn the moment the crystals are disturbed, but always remains tractable, yielding towards the point of least resistance. One of the first things necessary for the operator whose mind and hand have been trained to the use of cohesive gold is to forget a whole lot, or at least lay it away to be used after awhile, as the methods and requirements are so radically different. In cohesive gold it is the first piece that must be made fast; all that follow must in their turn be made fast to that preceding. Failure to cohere is fatal to the integrity of the work. In the use of non-cohesive gold, tin, and tin-gold, it is the last piece that holds the filling in place, like the key-stone of the arch, and cohesion is a misfortune to the extent that it prevents the movement of the layers of the material, no matter which is being used. In the first the piece is usually placed in very small particles without reference especially to the size of the cavity, and as before stated, adhesion or cohesion (annihilation of space) must be had where it cuts no figure in the matter of preserving the tooth. Absolute juxtaposition of the gold and tooth is the only condition that will fill the requirements of the case. In the last instance the material may be used in as large pieces as can be manipulated in the cavity, decreasing in size as the work progresses. They should

be compressed to the most intimate relation of the particles before placing them in the cavity. This saves much time, labor, and fatigue. The indispensable condition is here as in the other, namely, absolute juxtaposition of the tooth and the material. Just here it occurs to the writer to inquire why there is such a passion to make a filling solid throughout its bulk. Who ever saw a filling fail at any point except somewhere around the margin? Did anyone ever see one fail anywhere within its circumference?

The writer begs leave to assert that a tooth filled as it ought to be filled, cared for as it ought to be cared for, is immune to decay. To be sure this implies good judgment in the selection of material, perfect manipulation in placing it on part of the dentist, and absolute cleanliness on part of the patient. The first two are barely possible; the last, even if possible, is highly improbable. All decay is the result of uncleanliness, from which follows fermentation and the development of microorganic life, whose product—lactic acid—is the active agent of decay.

Absolute cleanliness then being out of the question, it is certainly wise to look for something that shall counteract the influence of this agent. This we have in tin foil. The question naturally arises, Why is tin foil better than gold? Because gold is not chemically acted upon by the fluids of the mouth; is inert, exercising no influence either one way or the other; at best only filling the cavity, the environments remaining the same as before the filling was made. But in what is tin superior as a filling? Being chemically acted upon by the fluids of the mouth, oxid of tin, an impalpable powder, insoluble in the fluids of the mouth, is formed which, entering the open ends of the dentinal tubuli, interposes an impassable barrier to the ingress of the agents of decay. This action takes place on the entire surface of the filling, within as well as without the cavity, the natural moisture being sufficient to induce corrosion.

Tin and soft gold are more easily adapted to the walls of the cavity than cohesive gold, and as already stated, upon the perfect adaptation of the filling to the cavity walls and margins rather than its solidity the efficiency of the filling depends. All margins of cavities swept by the action of the cheeks, tongue and lips are by courtesy termed "self-cleansing," and such as are in sight may be safely filled with gold. All margins not so swept are danger centers, and being out of

sight should be filled with tin; at least with a good lining of tin against the margins.

As evidence that the writer does not stand alone in his opinion of tin, a few quotations are given from men of unquestioned skill and reputation in their day. These quotations also prove that it is not by any means a new and untried fad. The first reliable account of tin as a filling dates from the year 1783. In 1850, Dr. Whitney said, "I have seen tin fillings forty-one years old (made in 1809) still perfect." Dr. Neal, 1843, says, "I put in tin fillings, and at the end of thirty years they were badly worn, but there was no decay around the margins." This condition the writer frequently saw in the early days of his professional life. They are never seen now, more's the pity. Dr. Holmes, 1848: "I consider tin good for any cavity in chalky teeth; it will save them better than anything else." This has also been demonstrated in the practice of the writer. It is almost a specific for such teeth as described. Dr. F. A. Brewer, 1863: "Eleven good plugs, twenty-nine years old, in one mouth demonstrate that tin will last as long as gold in many cases." Dr. Castle, 1873: "Tin stops the ends of the tubuli and interglobular spaces which are formed in teeth of vascular organization; if more teeth were filled with tin and a smaller number with futile attempts with gold, people would be more benefited." Dr. Dixon, 1880: "I never saw a devitalized pulp under a tin filling." At the World's Dental Congress at Chicago, 1893, Dr. H. L. Ambler read a paper on "Tin Foil for Filling Teeth," taking strong grounds in favor of its use. Among many who discussed the paper appear the following: Dr. Darby: "I have always said that tin was one of the best filling materials we have." Dr. R. R. Freeman: "It has therapeutic properties, and is one of the best filling materials we have." Dr. Corydon Palmer: "For fifty years I have been a firm advocate of tin." Dr. Jarvie: "If all the tin is removed we find the dentin hard and firm." Dr. Barrett: "If everything were blotted out of existence with which teeth are filled more teeth would be saved." Many of the speakers mentioned the cohesive properties of tin, but their remarks are not given, as that question is not under consideration. It is respectfully asserted that testimony like the above will be supported by anyone who has had any experience with tin as a filling, and one who has not had experience is not a competent witness.

The question naturally arises, If tin be so much better than gold,

why is it not used more? May the writer be allowed to say that since the introduction of cohesive gold, the rubber dam, and the mallet, the art of using non-cohesive gold and tin and hand-pressure without the rubber dam has been well-nigh lost?

All changes made in the last thirty-five years have not been improvements by any means. The inventive genius of the profession has been turned towards the prosthetic branch; our journals teem with cuts and descriptions of crowns and bridges; but of the five journals that come to the table of the writer every month there cannot be found on the average one article a year on the legitimate feature of our life work. Is the making of artificial limbs a part of surgery? Surely and truly the saving of teeth instead of their destruction and subsequent replacement should be the first and supremest care of the ambitious dentist. Do we seek as we ought to the best means of saving them, or are we not too often satisfied to be simply oral jewelers, making something to be admired, something that will attract attention and bring us business? Where does the professional feature come in? This spirit is excusable in the tailor, the shoemaker, the milliner, and dressmaker, because they do not have to sacrifice the useful to enhance the beautiful, but it is certainly a questionable proceeding on the part of a professional man to pursue such a course. The writer claims no superior skill except as one may become skilled along lines of work that one most enjoys, but does claim a superiority in the materials and their combinations according to the case in hand.

What advantages, if any besides greater permanency, may be claimed for these materials and methods? Briefly, less time required to excavate and prepare the cavity, no retaining pits or grooves being necessary except where contouring is required; less work and expenditure of nerve force on the part of the operator; less pain and expenditure of nerve force on the part of the patient; so much of the work done without the rubber dam, and so much shorter time, less irritation of the salivary glands, and less draft upon the blood stream, less expenditure of nerve force required in secreting the saliva; because of the laminated structure of soft-foil fillings less thermal shock; the more tin used the less the shock, and by so much is the danger of hyperemia and possibility of the death of the pulp reduced. By reason of the corrosion of the tin the tubuli are blocked and the entrance

of microorganic life and the probability of recurrence of decay are lessened.

The weight of the gold most favored by the writer is No. 4 and No. 60 and of tin No. 4 S. S. W. If the filling is made wholly of gold the No. 4 is always made in cylinders; the heavy foil is cut into strips from half an inch to an inch in length and from one to three millimetres in width, both governed by the size of the cavity. Tin alone is also used in cylinders, and when completed with gold the heavy gold is always used. Tin and gold No. 4 combined are folded together and cut into mats or blocks.

Thirty-six years' practice with non-cohesive gold and tin with hand pressure and cohesive gold with the mallet has convinced the writer that if the mallet were thrown away, the profession retaining cohesive gold, for it has its place which nothing else can fill, the rubber dam, non-cohesive gold, and tin, and then combining them according to the indications, much greater good would be accomplished for those who favor us with their patronage.

Preparations and Combinations of the Different Metals.—The writer's preference for gold and tin is in the form of cylinders; for tin-gold in the form of blocks. When cohesive gold is mentioned let it be understood that No. 60 or No. 120 is intended. This is cut into strips about one inch long and one to three millimetres wide, and annealed as used. To make cylinders, a folded napkin or foil pad, paper knife or spatula, pliers, three-sided broach are all that are really necessary. Fold the sheet of foil twice; if it is desired to make very small cylinders this strip may be torn into two, three, or more pieces. This is easily done by laying the knife at the place it is desired to separate it, at the end nearest the operator; take hold of the right upper corner, and pull against the knife. *Do not cut.* Now consider the depth of the cavity, for upon that depends the width of the ribbon that is to determine the length of the cylinder, which should be from one-fifth to one-sixth longer than the depth of the cavity. If the cylinder be of tin it does not make much difference except in the labor required to finish it down. With gold it does make quite a difference in the matter of loss. It is not an uncommon thing for the writer to make one cylinder of a sheet of No. 4 for grinding or proximate-surface molars. It is hard to give any directions in regard to the looseness or density of the

cylinders, as that depends so much on the case in hand that each one must learn for himself, and perhaps no two would agree upon it.

The manner of making mats or blocks does not differ from the procedure already given except that the folding should be continued as long as it can be done and each fold should be made as compact as possible. *Press the wind out before you place it in the cavity.* Cut the blocks in suitable lengths to correspond with the depth of the cavity, as already directed. When blocks are used some very small and dense cylinders are needed for the completion of the filling. These may be made of tin or gold. To make blocks of tin-gold, lay one sheet upon the other, no matter which is uppermost, fold as long as any folding can be done, observing the rules already laid down to compress as compactly as possible. Cut into lengths as already indicated.

Preparation of the Cavity.—It is not an easy matter to fully describe the preparation of the cavity, the placing of the filling, etc., within the limits of a magazine article. Only a few general principles will be given; the learner will make better progress to work out the detail for himself. But few cavities will require more than the proper cleansing of all decayed tissue and trimming of margins, the form of the cavity being sufficient to retain the filling. Shallow fissures should be shaped with the inverted cone, whose smaller diameter is the same as the bur last used. This will leave the floor flat and increase the retentive form. Especial attention should be paid to this when the filling is to be anchored in the fissure, as in compound fillings in bicuspids and molars. One of the first things to be considered is the requirements of the filling and shape it accordingly. Surely a filling that has no antagonist does not require such strong retentive form as one that is squarely antagonized. And there is a principle in mechanics that ought to be considered also. All compound fillings are levers of the second class. In the filling the cervical border is the fulcrum, the anchorages the weight to be moved, and the force brought to bear in chewing and swallowing the power moving that weight.

Now, this power is always applied at one point, namely, the proximogrinding angle. If our weight be fixed as nearly opposite the power as possible more power will be required to move it. Turn a pair of steelyards upside down; fix the long end of the shaft; attach a weight to the hook at the other extremity; take hold of the weight

of the steelyard (now the power), and by moving it from one extremity of the shaft to the other a very good demonstration can be had of the principle that we are trying to elucidate. This, it is to be hoped, will show the folly of digging great holes in the cervical wall for retention, or even great canals in the lateral walls for the same purpose, when much less work and material would accomplish the purpose on the grinding surface; in other words, put the weight opposite the power. If, as already intimated, there be no antagonism, and no fissure communicating with the cavity requiring a filling, the lateral walls may be relied on to give sufficient strength (weight).

In simple cavities on grinding surfaces the power tends to crush (not displace), and if the filling be made of soft foil, tin-gold, or tin, and susceptible of motion, the tendency will be to cause a still closer

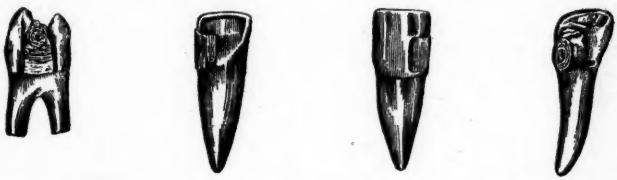
FIG. 1. FIG. 2. FIG. 3. FIG. 4.

adaptation of the filling to the walls. If, however, the filling were made as it should be, there would be no change of the individual layers. With this digression, which to the writer seemed pertinent, the filling of individual cavities will be considered.

Probably the easiest filling to make is the first lower molar, grinding surface. If (as in Fig. 1) the cavity is large enough, let a full sheet be made into a ribbon for rolling into a cylinder, which should be long enough to protrude above the cavity margin. This must *always* be the case, no matter how compactly the ribbon has been folded or the cylinder rolled. If the cavity is irregular in shape, as it usually is, more than one cylinder will be required. (See Fig. 2.) Once in a while a cavity will be of such perfect cylindrical form that by using care in rolling, and inserting with a sort of screw motion, one cylinder will suffice. In condensing, press or batter it down as one would a rivet. Referring again to Fig. 1, it will be seen that one cylinder only has been used. The next ones must be much smaller. Press them toward the wall all the time, keeping in mind the rule

that a cushion of gold must at all times be kept between the instrument and the wall, completing the filling somewhere remote from the margin. The cylinders, if rolled compactly, should not be opened after placing them in the cavity, but separated, and what more may be required forced between. If loosely rolled, they may be opened and smaller ones forced into the center of each. (See Fig. 2.) All this will come so easily to the operator that it needs only to be mentioned. In Fig. 3 may be seen a cylinder made of a four-grain sheet of tin. In shaping a cavity for a filling like this it is only necessary that the walls be parallel from without inward, no matter what they are from the grinding surface toward the cervical wall. The cylinder should be large enough to fill the cavity to the plane of the pulpal wall after being condensed in the direction of the long axis of the

FIG. 5. FIG. 6, *a*. FIG. 6, *b*. FIG. 7.



tooth. (In the figure the cylinder is left open to better show how it has been inserted.)

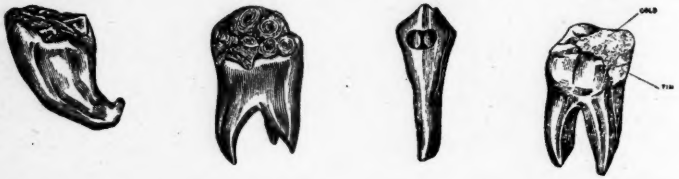
In Fig. 4 will be seen the cavity filled with blocks. At this point the tin is ready to be condensed in the direction of the cervical border and completed with cohesive gold. The writer would force the blocks close to the lateral walls, then a strip of heavy foil down between the blocks as solidly as possible, and condense all together and finish with cohesive gold. A favorite method of the writer's when there is room to do so is to pass a mat of tin or tin-gold between the teeth as he would a file and bend it back into the cavity, completing with cylinders or blocks and cohesive gold as before. (See Fig. 5.) In this can be seen how perfectly the border is protected.

In filling all proximal surfaces, when the adjoining tooth is in proper relation to the one being filled, the blocks or cylinders should be long enough to bind in the space enough to hold them in place. The writer regards the matrix as worse than useless; and why should the view be obstructed after the effort that has been made to get it?

He would not in any case use it, preferring as complete a view as possible.

In Fig. 6 is shown a cavity which is quite common in practice—a central incisor with the lingual, labial, and proximal surfaces involved. In such a cavity where the cutting angle is strong there is needed only a very slight enlargement of the cavity in the direction of the cutting and cervical walls; in looking at the filling from the standpoint of its requirements we find that all that is required is that it shall stay in and protect the margins. There is no strain upon it nor can there be, while the deeper we cut toward the cutting angle the weaker we make it and only court disaster in the future, and the futility of digging great holes in the cervical area because it is strong must be apparent to the most superficial thinker. In this case great care should be given to cutting the blocks of such length that they will bind slightly when inserted. The blocks may be passed

FIG. 8. FIG. 9. FIG. 10. FIG. 11.



outward from the lingual toward the labial aspect, and if of gold may be passed clear through and nicely pressed against the labial margin of the cavity. If the blocks are of tin or tin-gold that must not be done for obvious reasons. When the cavity has been filled as this appears when looked at toward the proximo-lingual aspect (Fig. 6, *a*) the filling should be completed with cohesive gold, anchoring in the angles as shown in the view looking toward the labial surface. (Fig. 6, *b*.) After a good veneer of gold has been laid on the labial face of the filling no fear need be held that it will come out. Condense the tin, complete the filling with gold, and finish it as usual.

In Fig. 7 is shown a cavity which of course should be filled with soft gold in form of a cylinder large enough to fill the entire proximal surface as shown, to be completed with No. 60 gold, annealed as used. The gold cylinder should be condensed before adding any more.

In Fig. 8 is seen a form of filling which the writer has found very convenient in the distal surface of a second or third molar cavity, mouth small and the muscle short. If the cavity can be made of the same width across the tooth the operation is much simplified, yet it is not necessary. If the cavity be wider between the lateral walls on proximal surfaces a block or cylinder may be enwrapped in the strip that shall be long enough after being doubled to reach across the tooth from the mesial to the distal surface. Again, if the cavities on either or both surfaces extend below the plane of the pulpal walls they may be filled up to it and the filling completed as directed. This is not fanciful, but as near as may be a duplicate of one made with tin in the distal cavity of the third molar, finishing with soft gold in the grinding surface and without the rubber. It was seen seven years after and was doing good service.

Fig. 9 shows a case that is peculiar only in the form of the cavity. This should be prepared by using the cone-shaped bur as already directed. Part of the filling has been made with cylinders and part with blocks, or rather mats set with the edge against the pulpal wall. Where cavities are of such shape as in this and Fig. 8 a broad blade, not sharp enough to cut and of proper angle, is very handy to carry the material, whether soft gold, tin, or tin-gold, to place.

In Fig. 10 is shown the manner of shaping a cavity in buccal and labial surfaces. They should be made deeper at each extremity, and the walls be made parallel to each other. The filling is started at either end with a cylinder; another in the center if well chosen will complete it; this may easily be done in five minutes without the annoyance and pain of the dam.

Fig. 11 shows one tin cylinder on the proximal surface and the contour restored with cohesive gold.—*Brief.*

X-RAYS IN THE TREATMENT OF PYORRHEA ALVEOLARIS. By Wm. Guy, F. R. C. S., L. D. S., Ed., London. In my own hands very careful scaling and cleaning with Izal locally have seemed to afford better prospects of relief than with any of the many other local applications I have tried. I determined some time ago to try as an adjuvant to the routine treatment exposure to the X-rays, so waited till I got what should appear to be so bad a case as to be almost if not quite hopeless. Such a case turned up in my department of the Royal Infirmary, and the result has been,

if not conclusive, at any rate sufficiently encouraging to warrant me in reporting the case and its treatment. Case G. A. S., age 38, married, student of medicine. Complaint: Tenderness of gums, loose teeth, and occasional attacks of severe toothache, especially in bad weather. Diagnosis: Pyorrhea alveolaris. History: Patient's teeth have not been satisfactory for as long as he remembers, and he has from time to time had attacks of toothache, for which he had teeth extracted. During the last five years there have been no very severe attacks of toothache, but the gums have been very tender and the teeth have been getting very loose, two having been extracted during that time on account of looseness and tenderness. A plate was fitted to maxilla about two years since, and has been worn constantly except when there was extra tenderness during cold weather. Patient applied for advice on account of severe attack of toothache accompanying an attack of influenza. Previous health was good. About thirteen years since he suffered from chronic gastric catarrh, but has had no trouble since. During infancy he had trouble (septic or tubercular?) in elbow-joint, which is now ankylosed. About the age of 15 he had an attack of acute rheumatism which lasted for a week, but has had no rheumatic symptoms since. Social conditions: Comfortable. Family history: Father and mother alive and healthy; grandfathers and grandmothers died of old age. Has three daughters, all of whom are perfectly healthy. Brothers and sisters healthy. Circulatory, digestive, and respiratory systems satisfactory. Urine normal. Habits temperate. Moderate smoker. Has never taken mercury or potassium iodid.

In connection with this case it is worth recording that there is a chronic hyperplasia of the submaxillary glands, and that when the condition of the teeth became acute there was always considerable edema of the tissue surrounding them. These particulars the patient who, being a medical student, took a lively interest in his own case, supplied me with himself.

I found the lower incisors, cuspids and premolars all very loose, the gum festoons hung patulous away from them, the gum was unhealthy, spongy, livid, almost purpuric in appearance, pus freely exuded round the necks of the teeth. In the upper jaw the two central incisors and a number of roots required extraction. The lower teeth were highly hypersensitive to thermal stimuli, the patient was thereby greatly inconvenienced, having to cool his tea and

warm his beer before venturing to drink either fluid. He was quite unable to use the affected teeth, and cessation of functional employment may, I think, be worthy of attention as an occasional contributory cause of pyorrhea alveolaris.

I took the patient over to the Dental Hospital, and Dr. Fenwick undertook the preliminary scaling and cleansing of the teeth. I then arranged with Dr. Spence, of the X-ray department of the Infirmary, to give him exposures on alternate days. We agreed that it was not desirable to push the exposures to the production of reaction. Three minutes has been found sufficiently long, although several have been given for five minutes. A sheet tin mask with suitable aperture was used, and I may note that the patient, using his hands to hold the mask in position, incautiously exposed them and incurred a pretty severe dermatitis. From the first exposure improvement in the state of the gums was evident, and after each exposure the teeth were less sensitive to hot and cold liquids. At the time of writing he has had twenty-one exposures. He says his mouth is more comfortable than it has been for years. The lower teeth which were quite loose are firm, a very little pus can still be expressed round the lateral incisors. The gum is hard, firm, and healthy. He can go out in the coldest winds, which are incessant here, without inconvenience, and in the way of fluids can, in his own words, "tackle anything." I propose to insert an upper denture, in the hope that restoration of function may help towards recovery. Now, while I admit that it is possible that much, perhaps all the improvement in this case might be due to the measures adopted other than the X-rays, I would ask you to remember that I selected the case because it was one that did not look as if anything could do much good. Indeed, those who saw it at the time laughed at the idea of trying the rays in such a hopeless case. I make in the meantime no claim for the X-rays, but in view of this case I feel justified in suggesting to the members of the Society that it would be worth while trying them as an auxiliary therapeutic measure in this condition, which only too often baffles and defies our best efforts.—*Dental Record.*

THERAPEUTICS. By W. Clyde Davis, M.D., D.D.S., Lincoln, Neb. *Adrenalin.* The extract of the suprarenal gland is one of the comparatively new additions to the armament of the general

practitioner. Chemists tell us that it has been a difficult matter to get the active principle of the gland into a uniform and stable solution, but this seems now to have been satisfactorily accomplished and is upon the market under the name "adrenalin," to which I wish to call the attention of the dental profession.

Composition. Adrenalin is composed of one part of the active principal of the gland with 999 parts of a normal salt solution, to which is added 0.5 per cent chloretone, thus adding to the properties of the gland those of a germicide and a local anesthetic equal to one per cent cocain, as chloretone is ten times as powerful as cocain.

Medical Properties. Adrenalin is a powerful vasomotor stimulant, a hemostatic, astringent and a valuable local anesthetic. The latter property is due not only to the presence of the chloretone but to the ischemia it induces.

Therapy. Adrenalin is being widely used in surgery in the way of hypodermic injections and as a bath to freshly-opened tissue for a threefold purpose: First, either alone or in combination with other reagents as a local anesthetic; second, to render the field of operation comparatively bloodless; third, as a cardiac and respiratory stimulant, thereby lessening the dangers of shock, syncopy and drug poisoning. It also finds many uses in the various inflammatory diseases of and hemorrhages from mucous membrane and tissue where capillary congestion exists.

Painless Pulp Extirpation. By the combination and method given below any dentist can make the application and completely remove the pulp from any tooth under any and all conditions for any person, even a child, in from 60 seconds to three minutes without pain or feeling on the part of the patient. Apply the dam if possible and dry the cavity. If pulp is not exposed but covered with a layer of softened dentin, apply first a drop of adrenalin, then one drop of a 40 per cent solution of formaldehyd. If quite a distance from the pulp use slight but continued pressure with a rubber plug for a few seconds. You can now excavate to complete or near exposure painlessly. You are now where we all usually make our application of arsenic for devitalization and are ready to begin with the operation. Apply to the cavity one drop of adrenalin (best applied by capillary attraction), taking some up in the operating pliers. Lay in the cavity a few crystals of cocain or a small 1-6 grain soluble tablet. Apply one drop as above of a 40 per cent solution formaldehyd. Apply

pressure with a rubber plug, at first very lightly but steadily, with not enough pressure to cause patient any pain, gradually increasing the pressure until at the end of forty to sixty seconds you are kneading the rubber into the cavity with burnishers with all permissible force, none of which should cause your patient any pain. Now remove covering to the pulp chamber and pass broach slowly towards the apex. If there is a tendency to much hemorrhage or patient should feel in the slightest degree any movements of the broach, repeat the method again, being sure not to omit the formaldehyd. At the close of this you can remove the pulp of any tooth without the patient feeling the operation, and in cases where the tooth is slightly sore to percussion, as in the advanced stages of pulpitis, the soreness will have disappeared, as many times I find that the peridental membrane has lost its tactile sense. In case of a large apical foramen where you are bothered with hemorrhage, again apply only the adrenalin, with pressure for fifteen seconds, and not another drop of blood will be discharged. Those who will may proceed with root filling. I prefer to dress the root with a non-irritant dressing (campho-phenique) for twenty-four hours and then fill.

The advantages of the above are: First, it is painless; second, it saves time; third, the color of tooth is never changed; fourth, the after-soreness is slight and many times wanting; fifth, your application is a powerful antiseptic. It is essential that the above be used in the order given or only partial success will result, as the adrenalin must be applied first to contract the pulp, thus drawing it away from the exposure to prevent pain. On first making pressure you can use a rubber plug, or beeswax, or a patent rubber cup which is on the market, as you prefer. I prefer vulcanite rubber.

For Sensitive Dentin. Adrenalin alone, with or without pressure, will render the dentin so that it can be excavated without pain in every instance if applied until pulp is affected, but I have been afraid of its effect upon the pulp and have used it generally without pressure, which renders about nine out of ten painless. I have as yet had no deaths of the pulp following such use, but it is certain that it has a greater action in this direction than any other agent advocated.

For Extraction. Put in a small dish three or four drops of adrenalin and a 1-5 grain soluble tablet of cocain which will make a solution. Add to this twenty drops of hamamelis (this fills an

ordinary syringe). Inject in parts to be lacerated. You are ready to operate in two minutes. You have here a pure, fresh antiseptic solution antagonistic to inflammation. I am not in the least afraid of rather large doses of a fresh solution of cocain, but the reader will please remember that adrenalin is the most powerful antidote known for cocain-poisoning, and is indicated hypodermatically in all the symptoms which arise in cocain-poisoning, whether that drug has been given or not.—*Items.*

THERAPY OF VARIOUS FORMS OF LIGHT AND RADIO-THERAPY. By James MacFarlane Winfield, M. D., New York. (*Brooklyn Med. Jour.*) After careful search through the literature of radio-therapy it is safe to assume that over ninety per cent of the cases of lupus treated by this method are cured. Only two cases have come under my personal observation; both were cured after twelve exposures and have remained well for nearly a year. The results in lupus erythematosus do not appear to be as good as those treated by the Finsen light. Judging from the reports, radio-therapy has a beneficial and curative effect in about seventy-five per cent of epithelioma, including rodent ulcer. My experience is about the same.

At present I have under treatment an exceedingly interesting case of epithelioma in a man eighty-one years of age. The cancer involved nearly the whole of the under lip. The universal opinion of the surgeons consulted was that it was an inoperable case, because of his age and the existence of a severe and far advanced Bright's disease. The malignant growth had been aggravated by the application of caustic pastes, so that when the ray was first applied the lip was a foul-smelling suppurative mass. After the third application the discharge ceased. The ray has been applied twenty-six times, the average duration of sittings twelve minutes, and now the disease is practically cured.

The results in carcinoma, especially post-operative, are sufficiently good to warrant the following up of the surgical measure by the X-ray, and from the reports of careful observers radio-therapy should be employed in all cases of inoperable carcinoma. During the past year I have used the ray in six cases of cancer of the breast, two primary and four post-operative. The first two received, respectively, four and eight exposures of ten minutes' duration, ex-

tending over a period of three months; in the one receiving four treatments the size of the tumor remained stationary, while previously it had grown rapidly. In the other case the tumor began to diminish in size after three exposures; when she was last seen it was at least one-half smaller than before treatment. As these patients were hard to control they were finally lost sight of. In the four post-operative cases one died from exhaustion after only a few exposures to the ray; in one the skin and cicatrix were thickly studded with new growths; after twelve exposures the small tumors had entirely disappeared and the large ones were greatly diminished in size. The patient is still under observation, and although the ray has not been applied for nearly four months the malignant process does not seem to be making any headway.

The third case of inoperable carcinoma is interesting because it shows microscopically that the X-ray inhibits the growth of the carcinomatous cells. Six weeks after operation the patient was referred to me for treatment because of a rapidly growing tumor situated just outside of the cicatrix. The growth was hard and showed unmistakable signs of malignancy, but decreased after eight treatments; then for unavoidable reasons the exposures were suspended for nearly three weeks. When the patient again presented herself it was found that the tumor had nearly doubled in size, and the overlying skin was inflamed (not, however, an X-ray dermatitis). Surgical procedure was advised, and a second operation was immediately done; the growth was found to consist of broken-down material, and scattered through the adjacent fascia and deeper structures were numerous hard nodules. Everything that appeared suspicious was removed and sent to the pathologist without any comments regarding the case or reference to the ray treatment; he reported that undoubtedly the tissues were carcinomatous, but they showed evidences of having undergone some peculiar change which had stopped the cell growth. A similar observation regarding the power of X-ray over carcinomatous cells has recently been made by Mr. Stephen Mayo, an English physician. My patient is still under observation and treatment, and so far there are no signs of recurrence.

Considerable discussion is now going on regarding the beneficial effect of radio-therapy upon pelvic and abdominal malignant neoplasms; some claim that the growth of these tumors is stopped, and

many times they disappear altogether. While on this subject it is well to notice that the X-ray is capable of and does cause absorption, and conservative men have suggested that the use of a powerful ray might produce metastasis of the malignant process. This is a reasonable surmise, and before we advise or use radio-therapy in deep-seated or inoperable malignant disease the case should be thoroughly understood and all evidences carefully weighed; then if the results are grave we can feel assured that our patient has received the best that medical science can offer, even to the last resort, and the stigma of quackery is removed from a method that is of undoubted value.

Very few authoritative reports are obtainable regarding radio-therapy in the treatment of sarcoma, but from recent observations by Coley it appears that the ray has an inhibitory effect upon this form of cancer. All agree that it lessens and many times absolutely relieves pain; this alone would be sufficient to warrant the continuance of this procedure in sarcoma. I have used the ray in two cases, one of the jaw and the other of the glands of the neck, but neither derived any benefit except relief from pain.

UREMIC STOMATITIS AND ITS DIAGNOSIS. By Dr. E. Hertz. (*La Semaine Médicale—Cosmos.*) The essayist describes the case of a man, aged fifty-one, who entered the hospital for the treatment of a persistent cephalalgia. He presented respiratory disturbances which were pathogonomic of respiratory uremia. During the examination it was observed that the patient had a very fetid breath, caused doubtless by the diseased condition of the oral cavity. The teeth were covered with thick and viscid deposits and the gums had receded considerably. The gums presented at certain places eroded areas of circular shape covered with a pultaceous substance, which could also be found upon the mucous membrane of the cheek. Grayish plaques could be seen upon the internal surface of the cheeks at the level of the teeth. These were round and festooned, and were sharply outlined upon the mucous membrane. After removing this grayish covering, which had a very repulsive odor, a superficial erosion of the mucous membrane could be seen. These plaques were located on both sides; those upon the left side were close to each other and formed a grayish band, from the upper third molar to the central incisor. In the lower jaw the lesions

were located in the neighborhood of the lower molars and formed two plaques separated by a bridge of mucous membrane. Upon the upper lid was seen the termination of the series of plaques which we have just described. Upon the lower lip was found a round plaque. Upon the right side the lesions were not so extensive, the largest ones being found at the level of the upper molars. In the lower jaw and upon the right side the lesions were not well marked, nevertheless in the neighborhood of the molar teeth a recently eroded surface was found. This was not covered by the muco-membranous layer, and its appearance reminded one very closely of the aphthous patch at the stage of erosion. Nothing abnormal could be found on the tonsils or in the pillars of the fauces. The cheeks externally were normal, and salivation was not very abundant. "To recapitulate, we will say that the patient in question presented respiratory troubles of uremic origin and a stomatitis of an ulcero-membranous aspect."

The author then enters into the discussion of the symptoms and most characteristic features of ulcero-membranous, diphtheritic, and aphthous stomatitis, and says that the stomatitis just described cannot be classified in any of the foregoing varieties. Dr. Hertz diagnosed it as a case of uremic stomatitis, and it must be said that it was not only by a process of exclusion that he arrived at this diagnosis, but also by a comparison of the symptoms presented by his patient with those described by the two authorities on the subject of oral manifestations of uremia, Drs. Lancereaux and Barié. Dr. Barié has described two varieties of uremic stomatitis—the erythemopultaceous and the ulcerous. The essayist then describes the characteristic features of the two varieties. In the ulcerous variety of uremic stomatitis the absence of ulcerations upon the tongue, tonsils, or pharynx is a pathogonomic sign. The description of this variety agrees very well with the oral disturbances presented by Dr. Hertz's patient, and hence there remains not the slightest doubt regarding the correctness of his diagnosis. He does not refer to the pathological theories that have been advanced with reference to the production of uremic stomatitis, but just mentions the fact that the elimination through the mucous membrane of the mouth of toxins and chemical irritants, of urea in particular, is the most common and accepted theory.

As regards treatment, it is stated that its primary object should

consist in the elimination of the poisons from the system, and in the antiseptic treatment of the oral cavity by means of potassium permanganate or hydrogen dioxid. The author concludes his report with the statement that the characteristic lesions of uremic stomatitis make it possible to confirm the diagnosis of certain doubtful cases of uremia, and that it is only in patients who neglect their mouths, or those in a subcomatose state, that this variety of stomatitis is likely to develop.

A NEUROTIC WITH DENTAL AND ANTRAL MANIFESTATIONS. By John J. Madden, D.D.S., Buffalo. The writer met with an interesting case some time ago and deems it of sufficient interest to report. Mrs. B., a woman of 60 years, on the advice of her physician, called to be relieved of a neuralgia on the right side of the face. Examination showed that the teeth were very short and deeply imbedded in a thick and heavy alveolar process. In the superior arch she carried a bridge extending from the third molar to the central, a first bicuspid serving as a center support. In the lower jaw the second molar and all teeth in front of the second bicuspid were intact and apparently in a healthy condition. The symptoms described by the patient were in the nature of sharp, lancinating pains in the region of the superior bicuspid and a feeling of fullness in that locality.

Examination failed to give any adequate reason for disturbing the parts, and the patient was given over to the physician, who prescribed hypnotics and analgesics for several days, with little or no result. I decided to remove the work in the mouth, which I did, and on percussion found tenderness over the bicuspid; other symptoms developed later, as tenderness of the nose, with fullness and sense of pressure on that side.

In consultation with the physician I deemed the symptoms sufficient to warrant an exploration of the antrum, which was made by forcing a trocar through the socket of the bicuspid that had been extracted. The cavity was washed out with a solution of acetozone, and pus discovered. The part was treated for a few days and healed nicely, but, strange to say, the patient still experienced the same paroxysms of pain. The condition was allowed to run for several days, but with no abatement of the pains. It was deemed best to remove the molars and with them any possible dental irritations.

A tonic was prescribed in conjunction with trional and antikamnia, but after a week or more of waiting we obtained but little encouragement from the patient. Transillumination failed to show any trouble in the antrum. A specialist on nervous troubles was called in, and all concerned agreed in the fact that the patient was a neurotic. He now has her under a general and systemic treatment. We must naturally gather from such a history that these are symptoms that point to a tendency developing hypochrondia.

This is one phase of conditions that we may meet with at any time, and one in which the dentist should work in conjunction with the physician.—*Dental Off. and Lab.*

BOILS (FURUNCLES). Very often a dentist is asked by his patient what causes boils and what should be done for them. An intelligent reply should be given to so important a subject. The ordinary layman believes that his blood must be impure or he would not have boils, and he also believes that the boil or furuncle is a Godsend, because the pus which comes away brings with it the impurity from the blood. He believes it is better to have it come out than go in.

The direct cause of a furuncle is infection from either the staphylococcus pyogenes aureus or albus—a simple pus infection, which takes place in a hair follicle, a sebaceous gland or a sweat gland. Resistance to infection from such organisms is below normal in the region affected, or there is an excessive dose of infection. It does not follow that because a patient has boils his blood is impure and that boils are Godsends to purify it. No amount of internal drug-taking will cure a boil or prevent others from forming if the pus is allowed to trickle down over the skin and remain there. This accounts for the fact that several boils usually follow when the seed is once sown. A boil is a simple abscess beneath the skin.

The treatment of a boil is simple when the etiology and pathology are known. When pus has formed, remove it mechanically and disinfect the region; when pus has not yet formed, disinfect. The treatment used by the laity, also by many physicians, and set forth in text-books on surgery, is not always the simplest and best. It is a very simple matter to stop all pain and to prevent the formation of pus if in the early stages a hypodermic needle is forced into the center of the inflamed area and a small quantity of pure carbolic

acid is injected. If pus has formed, open where the abscess is pointing and inject some peroxid of hydrogen followed by pure carbolic. This treatment is simple and efficient. The carbolic is an anesthetic and disinfectant. The needle is almost painlessly inserted because it enters the center of the necrotic area. The pus is not allowed to run down over the skin to infect it. The pain quickly subsides, and there is no drugging, no dirty poultices, and no lancing. It is easy; try it.—EDITORIAL, *Dominion.*

BAKED PORCELAIN RESTORATIONS OF BROKEN BRIDGE FACINGS. By Joseph E. Duffield, D.D.S., Camden, N. J. Many vain efforts have been made to repair fixed bridges and broken crowns where the facings have split away from the backing, due either to accident or to occlusion which has been too close to permit of proper protection by the usual means. Those attempts have included the Bryant method of cutting a thread on the pins and attaching by means of a nut; cutting a dovetailed cavity in the backing and bending the pins of the tooth so as to key the work in place, and various others systems. Undoubtedly it requires no ordinary skill to so grind a plate tooth that it may approximately fit the backing already in position, and which is invariably of such thickness as to not permit of any adaptation by burnishing.

Again, after the tooth has been ground and fitted to the entire satisfaction of the operator, and the pins of the tooth in question passed through the openings in the backing, which have been very carefully tapped out to accurately receive the same, we so often find the thickness of the backing such as to prevent of sufficient countersinking on the palatal surface, thereby preventing the work from being securely and permanently attached by riveting or by tinning the pins and filling in with amalgam. To the writer one of the most objectionable features of the plans employed in repairing those conditions has been the uttter lack of close adaptation of the parts repaired.

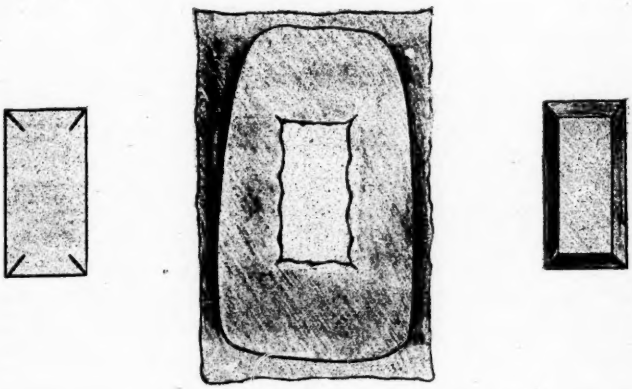
For the following operation, which has proved very satisfactory after a test of now nearly three years, two points of superiority are claimed—first, perfect adaptation; second, strength; two very essential features, and upon which rests the success of the work. In the employment of the method about to be described it is neces-

sary that the pins remain intact in the backing. After clearing away all particles of porcelain which may be adhering to the pins from the fractured facing, a cement filling is built around the same, making the sides parallel, the cement extending in a lateral direc-

FIG. 1.

tion only far enough to include the overhang of the pin-heads, the filling being flush with the tops of the pins; the object being to permit of the free drawing of the matrix about to be made. (Fig. 1.) Platinum-foil, gauge $\frac{1}{1000}$, is then burnished over the

FIG. 3. FIG. 2. FIG. 4.

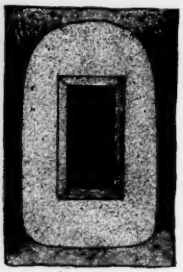


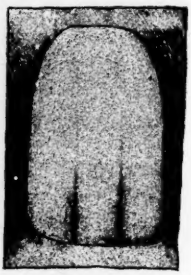
entire backing, the cement filling being permitted to protrude through the platinum-foil and extend well up on the adjacent teeth. (Fig. 2.) The matrix is then removed and laid aside, and a small piece of foil, cut oblong and sufficiently large to cover the cement

filling and extend down the sides of the same to the backing, is then prepared by slitting from the four corners. (Fig. 3.) The object is to burnish the foil over the filling and form a box without tearing. (Fig. 4.) With the box still in position the matrix already described is again placed on the backing and the two pieces joined with a small amount of paraffin. The entire work is lifted off and the paraffin eliminated by holding in a flame; a quantity of tooth body of the desired shade is then placed on the matrix and fused. (Fig. 5.)

There now being no danger of destroying the perfect adaptation by handling, it is again placed in position on the backing and a porcelain veneer or plate tooth, from which the pins have been

FIG. 5. FIG. 7. FIG. 6.





removed, and of a proper shade, is ground into position. Additional tooth body is added to the matrix and the under side of the veneer, which is then placed on the matrix and gently pressed in position. A few blasts of hot air are applied to carry off the superfluous moisture in the body, and with an excavator the matrix and veneer as one piece are gently lifted off the backing and allowed to fall on a doily. (Fig. 6.) It is then placed in the furnace and fused. The platinum foil is stripped off from the back, and with a small diamond disk the box or countersunk cavity in the porcelain is undercut. The cement about the pins in the backing is removed, and the work is ready for final cementation to position. (Fig. 7.) If the operation has been carefully executed we now have a repair which in point of contour and adaptation is eminently satisfactory, and one which is approximately as strong as the original.

NOMA, WITH REPORT OF A CASE. By Albert L. Midgley, D. M. D., Providence, R. I. Noma, a disease of childhood, which is also known as cancrum oris or gangrenous stomatitis, is a destructive, ulcerative condition of the mouth which makes its appearance upon the gum or mucous membrane of the cheek, and advancing with great rapidity destroys both soft and hard tissue and usually the life of the patient. It is essentially a secondary disease and occurs most frequently during convalescence from measles, scarlatina, or other exhausting diseases of infancy. It sometimes arises, however, when these diseases have not been present, although it may be said that it never occurs in healthy children, but that it is almost invariably found in the weak, anemic, poorly-nourished type. It is more commonly found in the female and appears most frequently in the lower jaw.

The cause of the disease is unknown, but many writers agree that the factors necessary for its appearance are a very low vitality and infection. Some say that it is of bacterial origin, and though many of the lower forms of life have been found, the reports as to their being the cause is a matter of opinion only. One micro-organism which is generally found is Lingard's thread-like bacillus. However, there seems to be no doubt that the disease is of an infectious nature, for several cases occurring in the same family have been reported. The excessive use of mercury favors its occurrence, and occasionally it has been found to follow an ulcerative stomatitis.

The onset of the disease is very insidious, and the most characteristic symptom is a very foul odor. Upon examination may be found an ashy gray ulcer on the mucous membrane of the gum or cheek, or at the angle of the mouth, which soon turns black. The cheek is swollen, tense, and shiny, and the skin, which is red, turns blue, and as the process advances a coal-black slough is left. A livid line marking the boundary of the diseased condition is also very characteristic. Other symptoms are an increased flow of saliva, drooling, coated tongue, diminished appetite, diarrhea, and high temperature, though it may become subnormal before death. The process very rarely becomes bilateral; relapses often occur, but the constitutional disturbance is very slight, and the child suffers little or no pain. A spontaneous recovery may take place even though there has been a great destruction of tissue, leaving a

frightful deformity and impaired function of the jaws. The duration of the disease is from one to three weeks.

As to the pathology, Starr says that four distinct zones can be distinguished. Surrounding the destroyed tissue there is an infiltrated zone, then an area of increased connective tissue, and outside this is healthy tissue. The prognosis of this disease is very grave. Seventy to ninety per cent of the cases are fatal, and many believe that complications make the prognosis absolutely fatal. The child may die from septic pneumonia, diarrhea, or septicemia.

The curative treatment of noma lies in an early diagnosis and a prompt and radical operation. Isolation is absolutely necessary and powerful disinfectants are to be made use of. Many believe in the free use of the Paquelin cautery and touching the parts with nitric acid or ninety-five per cent carbolic acid. A stimulating tonic should be given, and the mouth should be kept in as hygienic condition as possible. Although the therapeutics cannot be said to have a specific character, chlorate of potash internally and as a mouth-wash is advised. After the operative stage has passed palliative measures only can be resorted to, and by attention to carious teeth and the various forms of stomatitis during convalescence from the exanthemata much can be done in the way of preventive treatment.

I report the following case: R.-K., aged two and a half years; male; seen at St. Vincent's Asylum. The patient presented the following history: His mother died of pulmonary phthisis. A healthy father and brother were still living. There was no history of children's diseases, and the patient had always enjoyed good health up to the present time. October 1, 1902.—The patient was suffering from a dento-alveolar abscess of the right superior temporary lateral, and on this day I extracted the tooth, using chlorid of ethyl as a local anesthetic. Two days later there appeared at the gingival margin of the socket of the extracted tooth a black necrotic area, a quarter of an inch in diameter, which involved both soft tissue and bone. The skin of the upper lip on the right side was tense and waxy, and a distinct red discoloration of it marked the boundary of the inflammation. There was also a very foul odor, profuse ptyalism, and drooling. The tissues of the mouth were highly inflamed, and most of the teeth were in a very carious condition. October 4.—Diagnosis, noma. I operated under chloroform anethesia and removed the roots of the superior tem-

porary centrals and remaining lateral, since their crowns had been destroyed by caries. The necrosed tissue was entirely removed and the bone curetted and washed well with warm water and dioxygen. The wound was cauterized with carbolic acid ninety-five per cent and packed loosely with gauze saturated with xeroform. Syrup of iodid of iron was given as a tonic and a mouth-wash of one per cent silver nitrate was used every hour. The next day the patient appeared very comfortable, with normal temperature and pulse, and no pain apparently. The following day, to my surprise, the roof of the mouth, floor of the nose, and half of the right cheek were in

NOMA.

a gangrenous condition and beyond the stage of a second operation. From now until death, October 19, palliative measures only were used. The temperature during these days was 102° to 103° F. and the pulse ranged from 120 to 140 per minute. Diarrhea began the second day after the operation and continued throughout the disease. A specimen was given to the pathologist of the hospital for examination and he found a thread-like bacillus. The case is of interest, since the disease immediately followed a dento-alveolar abscess and attacked a strong healthy child. Another important point also to be considered is that two weeks previously a child died from the same disease in this institution.—*International.*

GERMICIDES: SOME DENTAL USES. By Elgin MaWhinney, D.D.S., Chicago. Read before the Chicago Dental Society, January 6, 1903. A germicide is an agent that destroys germ life and their spores. In dental literature the term is quite generally used to mean pus-germ destroyers. It is only since the germ theory of putrefaction has become understood that this word has taken on its present significance. The recent studies into the phenomena of life, physiological chemistry and pharmacology, bid fair to completely change our present system of therapeutics. We are beginning to see that our present accepted so-called rational system of treating pathological conditions is indeed most irrational and empirical. Not much longer will it do to treat certain conditions with certain remedies, simply because our fathers did, or even because we have observed in a previous case that good results followed like treatment. We must now know the reasons why.

There is no department of medicine (using the term medicine to include ours and all other specialties) that is so unscientific as that of therapeutics. Enough work has been done to show conclusively that all remedial agents of whatever nature that have any action upon the physical organism do so by means of the chemical relation which they bear to the organ, tissue, or pathological condition treated. They act by means of a certain selective chemical affinity. Certain organs and tissues under certain conditions attract and appropriate certain medicinal agents, when so placed as to be accessible. Scientists have for several years recognized what is known as the chemotactic property of cell life—the attracting and repelling force which one cell or set of cells exerts toward another. They look upon all organized life as a multiplication of cells, each having a specific function or functions and each related to the other in a chemical way. The whole physical life process is a chemical one. The laws which govern the selection and preparation of food, digestion, assimilation and throwing off waste material are chemical. This is not only true of the whole organism we call man, but is equally true in the microorganic world. Furthermore, it also holds true in the relation of the former to the latter. The baneful influences of microorganic life upon higher organisms are exerted through chemical processes. The solution of animal cell tissue, plastic exudate in wounds, and formation of pus are all chemical processes in which microorganic life plays the important role.

To-night I want to present the thought of destroying this micro-organic life and its baneful influence in animal tissue by chemical means. The disassociation theory of Arrhenius, which has many able exponents, and which has been developed to a marvelous point in recent years, throws much light on this problem. The theory explained in a few words is this: When certain organic and inorganic acids or salts are carried into solution, either in the body or outside, they split up into ions—the negatively charged ones called anions, and the positive ones called kations. The action of such agents therefore depends upon the nature of their ions. No longer do we deal in the main with the molecules of which a substance is composed, but with the ions into which it breaks up. "We know, for example, that we can substitute at will sodium iodid for potassium iodid in order to produce certain therapeutic effects. These salts are alike in that they both yield I-ions; they differ in that the former yield sodium ions and the latter potassium ions. Any similarity manifested in the therapeutic effects of these two salts is determined by the similarity of their iodin ions. But we know that the potassium iodid is much more depressant than the sodium salts. This is due to the direct poisonous effects of the potassium ions upon muscle and nerves, an effect not exhibited by sodium ions."

This same principle holds true regarding the germicidal action of drugs. They are efficient in proportion to the number of ions they contain. In mercury compounds, for example, it is not the amount of mercury in the salt, but the number of mercury ions that determines the efficiency. Example: A given per cent solution of $HgCl_2$ in alcohol; a solvent in which slight disassociation occurs is less potent than aqueous solutions.

What is needed now is an extended study of the exact action of various ions. We must learn what kind of ions produce a certain result. Then the chemist will have little difficulty in furnishing us with substances capable of disassociating into such ions as we need for a given purpose. This disassociation may often be brought about by first undergoing some change or changes within the tissue, and then going into solution and disassociation by means of the solvent in the tissues. With these ideas in mind the chemists have been at work with no end of new remedies as a result, many of which are useless because they have not been sufficiently tested, but rushed into the market to precede some other. A few are excellent, and to

some of them I want to call your attention. While these studies have been going on the physiologist has shown us that germicides act upon the protoplasm of the proteid molecule in this chemical way. Proteids are the most important substances occurring in animal and vegetable organisms. None of the phenomena characteristic of life occurs without their presence; they are invariably and constantly constituents of protoplasm. They are highly complex and uncrystallizable (for the most part) compounds of carbon hydrogen, oxygen, nitrogen and sulphur. The difference between the proteid molecule of higher forms of multicellular life and that of the purely vegetative forms has not yet been well made out.

An enormous amount of work is necessary to bring out the exact relation and composition of each. The inorganic salts, especially those of the heavy metals, such as mercury, iron, copper, lead, zinc, etc., act by forming insoluble compounds with protoplasm of bacteria. They do not penetrate deeply into the cell, and their action is therefore uncertain and usually very slight. $HgCl_2$ is the most potent of the group, because of its special toxic property, but its efficacy is greatly lessened if there are other proteids present, especially in the solutions which can be safely used on account of their toxicity.

The fatty acid series, the coal-tar derivatives, phenol, naphthol, resorcin, salol, thymol, guaiacol, cresol, etc., and to this group we may add beechwood creosote, salicylic acid, etc., also act by coagulating the protoplasm to a greater or less degree, but with these agents the coagulum is quite soluble, and so the agents if kept in contact penetrate deeper, and to that extent are fairly germicidal, especially to germs that have an easily permeable cell wall, and this is especially true of carbolic acid, which is more or less volatile.

It must be understood that none of these agents acts in a chemical way, but simply by coagulation, which is a molecular process. None of these agents enters into chemic combinations with the proteid. While the salts of the metals produce insoluble precipitates, and thus prevent greater penetration, so that their germicidal power depends upon the degree of precipitability of the different proteids. The aromatic series, to which belong the essential oils, can scarcely be called germicides. They act by simple irritation; in no sense chemic.

The oxidizers and reducers all tend to produce chemic changes

in microorganisms. They all act rapidly, and are rapidly decomposed by all organic matter. Hydrogen dioxid is perhaps the best known of this class of agents. The rapid effervescence is evidence of its rapid action. The failure to get good germicidal results from this class lies in the difficulty of bringing each germ into contact with the agents long enough to be destroyed. This difficulty is increased a hundredfold when used within the tissues of the body, for the reason that they are equally active towards the organic matter of the tissues.

There is a fact of vast importance which is often lost sight of in considering this subject, and that is this: In application of germicides to suppurations we must consider the tissue in which the suppurative process is going on. Nearly all these old agents act more forcefully against the cells of the tissue than against the microorganisms therein. Most germicides are so coagulant or otherwise destructive of the cell tissue as to make their use in concentrated form dangerous, and most of them possess general toxic or other deleterious properties after absorption which often endanger life. Therefore in the practical application of germicides we must always consider—1. Action on the system. 2. Action on the tissues of the part. 3. Action on the germs in the part. And this brings us to two important points for consideration, namely, (1) the stimulating influence that certain agents exert toward the normal cell elements of the part; (2) the antiseptic influence that certain agents exert upon the whole organism through the medium of the blood stream.

When suppurative microorganisms get into the injured tissue of a part by any means there occur some interesting things. The injured tissue will soon be seen to be literally filled with reparative cells, cells which are carrying the necessary elements of repair to the injury and carrying away the useless, discarded elements to be excreted and thrown off from the body. Mixed in this veritable beehive will be seen these microorganisms, and if conditions are favorable they will grow and multiply rapidly. A "battle royal" occurs between these invading enemies and the reparative cells; sometimes one is victorious and sometimes the other, depending upon (1) the condition and nature of the microorganisms; (2) the condition of the cells of the part; (3) the condition of the general system. There is some interesting detail in this connection but time forbids further elucidation. It must, however, be clear to everyone,

and this is the point I am trying to bring out, that favorable resolution may sometimes be brought about by directing our attention to any or all of these three things: (1) We may destroy or inhibit the growth of the microorganisms direct. (2) We may stimulate the cells of the part to increased activity and they in turn destroy, break down, these enemies. (3) We may act upon the whole organism with reference to stimulated circulation, assimilation and excretion, or increase the blood antisepsis, any one or all of which within certain limitations would be equally potent so far as results are concerned. This explains why we have long been using with good results certain agents which are not, strictly speaking, germicides. Iodoform, for example. I want to emphasize the need of attention to all three of these things if we would be very successful in treating serious suppurations. In every serious infection we should always look to the nature of the microorganism infecting; the condition of tissues of the part; and the condition of the whole system, with reference to nutrition, including excretion and circulation, and also the condition of the nervous system, before we determine what agent we shall use.

The methods employed for determining the germicidal power of agents are many, and all are imperfect, and whenever you read a statement of the germicidal power of any agent you must know the nature of the germs used in the test; how they were previously grown; how they were tested; in what media they were grown before and after, and what was the method of subjecting them to the agent, before you can have any idea of its value. All tests prove only so far as these things are known. Because an agent proves germicidal toward a particular germ or mixture of germs under certain conditions, using any method, it proves only so far as that series, but does not prove anything so far as other germs or methods of using are concerned; therefore *all* experimental tests are only relatively valuable, and useful only for comparison.

The literature of the medical and dental professions is full of conflicting statements regarding the potency of various agents classed as germicides, the reasons for which are explained by the foregoing statement. In most cases I have succeeded in duplicating the experiments when the above conditions have all been stated, and in not a few instances I have clearly demonstrated their faulty technique. I have tried almost every published method at some time

or other in the last five years, and have concluded that the method suggested by myself in 1899 is open to the least objection and yields results most nearly uniform. Yet I do not wish to convey the idea that this method will in any way accurately tell what will occur when applied to actual practice in treating suppurations in the living tissue; but when these results are applied to such treatment, and there studied, and modified to meet conditions, good results will follow. Until the chemistry of the proteid molecule under its various pathological changes is more clearly made out this is the best we can do. Pharmacology, the study of the action of remedies when practically applied, must at present be our main reliance. Science and experience must go hand in hand.

In making experimental tests it is essential that the agent used be pure and reliable; that the germs be exposed to it in equal numbers under the same conditions; that they be at their maximum height of virulency; be pure cultures, and that they be cultivated in media and temperature most favorable to their growth. In the experiments from which the following tables are made up the following method was used: Organisms were grown in bouillon made from lean beef (not beef extract) in the usual manner, and neutralized with sodium hydrate (not sodium bicarbonate). In series D and E it was made slightly alkaline. The germs were grown and distributed throughout the media in equal numbers, as shown by microscopic examination. The germs were transferred in loopfuls to small squares (a centimeter) of filter paper, which was previously sterilized and kept in a petri dish; there they were allowed to dry; then on to this was carried by means of the loop sufficient of the medicament to completely cover the filter paper, and left for various lengths of time, when each square was washed, so as to remove the medicament, planted in fresh tubes of culture media, and placed in an incubator at 37° C. Readings were taken from time to time for a week. The germicidal power of the medicaments is here determined by the time necessary to expose germs to it, and a great difference appears, as you will see. You will notice that some agents were used in full strength and others in per cent solutions, according as they could be employed in practice. In all of these series of experiments I began by exposing the germ to the medicament five minutes, and worked each way from that point, according as growth appeared or not. When doubt existed inoculations were

made in fresh media and in animals—guinea pigs and young rabbits mostly. In these tables only final results are given. They are made up after many repetitions.

SERIES D.

Germ used, staphylococcus pyogenes aureus. Grown and plated out from abscess pus.

Agent.	Per Cent Solution.	Time Required, Minutes.
Oil cassia	Full strength	55
Oil cinnamon	Full strength	55
Oil cloves	Full strength	55
Oil cajeput	Full strength	50
Oil eucalyptus	Full strength	60
Oil wintergreen	Full strength	60
Oil peppermint	Full strength	55
Oil cade	Full strength	50
Oil birch tar	Full strength	30
Oil pennyroyal	Full strength	42
Carbolic acid	95 per cent	30
Creosote, B. W	Full strength	40
Campho-phenique	Full strength	40
Guaiacol	Full strength	40
Thymol	Alkaline, saturate solution	30
Thiocol	Alcoholic, saturate solution	30
Aspirin	Alcoholic, 9 per cent solution	30
Bichlorid mercury	1-1,000	20
Phecen	Saturate solution	12
Creolin	Full strength	3
Trikresol	Full strength	5
Sublamin	1 in 250	5
Kresamin	Full strength	5
Phenol sulphonic	Full strength	5
Formalin	Full strength	3
Chinosol	10 per cent solution	1

SERIES E.

Germ, streptococcus pyogenes in virulent form from periosteal abscess.

Agent.	Per Cent Solution.	Time Required Minutes.
Oil cassia	Full strength	60
Oil cinnamon	Full strength	60
Oil cloves	Full strength	60
Oil cajeput	Full strength	55
Oil eucalyptus	Full strength	60
Oil wintergreen	Full strength	60
Oil peppermint	Full strength	55
Oil cade	Full strength	40
Oil birch tar	Full strength	30
Oil pennyroyal	Full strength	35
Carbolic acid	95 per cent	30
Creosote, B. W	Full strength	40
Campho-phenique	Full strength	60
Thymol	Alkaline, saturate solution	40
Thiocol	Alcoholic, saturate solution	32
Aspirin	Alcoholic, 9 per cent solution	22
Mercury bichlorid	1 in 1,000	15
Phecen	Saturate solution	10
Creolin	Full strength	5
Trikresol	Full strength	5
Sublamin	1 in 250	5
Kresamin	Full strength	5
Formalin	Full strength	3
Chinosol	10 per cent	1

SERIES F.

Germ, Proteus bacillus.

Agent.	Per Cent Solution.	Time Required Minutes.
Oil cassia	Full strength	55
Oil cinnamon	Full strength	40
Oil cloves	Full strength	45
Oil cajeput	Full strength	50
Oil eucalyptus	Full strength	50
Oil wintergreen	Full strength	55
Oil peppermint	Full strength	50
Oil cade	Full strength	40

Agent.	Per Cent Solution.	Time Required. Minutes.
Oil birch tar	Full strength	30
Carbolic acid	95 per cent	20
Creosote	Full strength	15
Thymol	Liquor. potass., saturate solution	20
Thiocol	Alcoholic, saturate solution	10
Aspirin	Alcoholic, 9 per cent solution	18
Naphtha eucalyptus	Alcoholic, saturate solution	10
Chinosol	10 per cent solution	1
Mercury bichlorid	1-1,000	22
Phecen	Saturate solution	10
Creolin	Full strength	8
Trikresol	Full strength	5
Formalin	Full strength	1
Tribromo phenol	Alcoholic, saturate solution	8
Trichlorphenol	Alcoholic, saturate solution	8

SERIES G.

Germ used, mixed pus culture.

Agent.	Per Cent Solution.	Time Required Minutes.
Oil cassia	Full strength	40
Oil cinnamon	Full strength	40
Oil cloves	Full strength	40
Oil cajeput	Full strength	45
Oil eucalyptus	Full strength	40
Oil wintergreen	Full strength	60
Oil peppermint	Full strength	50
Oil cade	Full strength	25
Oil birch tar	Full strength	20
Oil pennyroyal	Full strength	45
Carbolic acid	Full strength	30
Creosote, B. W	Full strength	30
Campho-phenique	Full strength	40
Mercury bichlorid	1-1,000	25
Creolin	Full strength	5
Trikresol	Full strength	5
Sublamin	1 in 250	3

Agent.	Per Cent Solution.	Time Required. Minutes.
Kresamin	Full strength	5
Formalin	Full strength	2
Chinosol	10 per cent	1
Phenol sulphonic	Full strength	5
Tribromo phenol	Alcoholic, saturate solution	10
Trichlorphenol	Alcoholic, saturate solution	8

SERIES H.

Bacillus pyoscyaneus. Isolated from pus.

Agent.	Per Cent Solution.	Time Required Minutes.
Oil cassia	Full strength	38
Oil wintergreen	Full strength	45
Oil cinnamon	Full strength	40
Oil cloves	Full strength	40
Oil cajeput	Full strength	45
Oil eucalyptus	Full strength	40
Oil wintergreen	Full strength	40
Oil peppermint	Full strength	40
Oil pennyroyal	Full strength	40
Carbolic acid	95 per cent	10
Creosote, B. W	Full strength	20
Oil sassafras	Full strength	40
Creolin	Full strength	5
Trikresol	Full strength	2
Formalin	Full strength	1
Sublamin	1 in 250	2
Bichlorid of mercury	1 in 1,000	5
Kresamin	Full strength	3
Phenol sulphonic	Full strength	2
Chinosol	10 per cent	1
Campho-phenique	Full strength	10
Eugenol	Full strength	30
Permanganate of potash	10 per cent	30

SERIES I.

Germ, bacillus prodigiosus.

Agent.	Per cent Solution.	Time Required, Minutes.
Oil cassia	Full strength	35
Oil cinnamon	Full strength	35
Oil cloves	Full strength	35
Eugenol	Full strength	32
Oil cajeput	Full strength	40
Oil eucalyptus	Full strength	40
Oil wintergreen	Full strength	40
Oil peppermint	Full strength	30
Oil pennyroyal	Full strength	35
Carbolic acid	Full strength	15
Creosote	Full strength	18
Trikresol	Full strength	2
Kresamin	Full strength	2
Bichlorid of mercury	1-1,000	5
Sublamin	1-500	2
Permanganate of potash	10 per cent	25
Phenol sulphonic	Full strength	5
Chinosol	10 per cent	1

These tables show only the time required to completely destroy all life. Nearly all agents showed marked restraint in less time. Many of the germs exposed to the essential oils fifteen and even thirty minutes grew as quickly and as luxuriantly as the controller. You will note the excellent showing made by the following agents: Formalin, sublamin, phenol sulphonic acid, trikresol, creolin, kresamin, phecen, chinosol.

The application of germicides as such to treatment of oral diseases is quite limited. It is only in violent, acute, chronic, necrotic suppurations; in syphlitic ulcers, eczema, etc., and in each case the selection of the particular agent will be determined by the conditions present. They are also of value as hand and instrument disinfectors.

Formalin is a colorless liquid, resembling water in appearance, and is a 40 per cent solution of formaldehyd gas. It is probably the most potent germicide that can be used. Its dental uses are lim-

ited, because of its extremely irritating property. I have used it in old chronic abscesses, but in nearly every instance severe pain and swelling resulted, which caused me to abandon it except in weak dilutions in such agents as creosote.

Paraform, a new solid polymer, has recently been recommended. There is a class of cases where it is of value if used with care. I refer to old blind abscesses on the roots of teeth containing small tortuous canals. This agent readily gives off formaldehyd gas, which is very penetrating. It should be placed only in the large entrance to the pulp chamber, and not down in the root canals, and even then it stirs up some irritation. In coming to this conclusion, I have lost some teeth from its use, but if you are careful and employ it as stated you will find it of excellent value. Recently some practitioners have recommended it as a component part of root fillings. I am somewhat skeptical of the result. In old chronic cases, where there is little or no discharge of pus, but instead a thin ichorous fluid comes weeping down into the canal, cases that are not causing any great amount of pain, but are sore and constantly annoying, in all such I get good results from this drug. It always increases the soreness and inflammation, which soon terminates in resolution. Perhaps the most valuable use we can make of this agent is as a disinfectant for foul rooms, for operating rooms where serious surgical cases are attended, and for instruments, especially those used on syphilitic cases.

Paraform has recently been put upon the market in tablet form, especially designed for use in Schering's sterilizer. It is both effective and convenient.

Bichlorid of mercury as a germicide was first brought to the attention of the medical profession by Koch, since which time its use has become almost universal. It is a potent germicide toward all germs that have a very permeable cell wall. It is very corrosive, producing insoluble coagulum, and therefore limiting its power. The most serious objections to it are its irritant and toxic properties. In dental practice its use has been generally abandoned, except as a hand disinfectant, and on gauze for packing suppurating antrum, also in syphilitic cases.

Sublamin. Ethylenediamin sulphate of mercury. A new agent recommended as a substitute for bichlorid of mercury.

Ethylenediamin is an organic base, with a chemical formula of

$$\begin{array}{l} CH_2—NH_2 \\ | \\ CH_2—NH_2 \end{array}$$

It is a clear, colorless liquid of alkaline reaction, and gives off the odor of ammonia. This substance is used in connection with several coagulant germicides, for the purpose of reducing their irritant property and increasing their penetrative power. Sublamin comes in solid form and is freely soluble in water. I have been using it in the strength of 1 in 500, and find it but very slightly irritating. It is a non-coagulant, and will penetrate much deeper than bichlorid. In all the tests it has proven much more efficacious than bichlorid, and it certainly is much more agreeable to use. I can heartily recommend it for sterilizing hands, washing indolent ulcers, flushing the antrum, washing through chronic abscesses, and sterilizing the skin before operations. For all these purposes I have been using it in my private practice as well as in the public infirmary. It is a chemical germicide, carrying pus into solution.

Phenol sulphonic acid is a light reddish-colored liquid, made by combining equal parts of sulphuric and carbolic acid. It is not so coagulant or irritating as either of the substances from which it is made. It can be used in full strength for burning through old chronic abscesses, and is especially recommended where cases are of long-standing, with more or less of bone absorption around the apex of the root. It is valuable to enlarge root canals, and to burn out the socket after a badly abscessed tooth is removed. Of course it must always be used with caution. A 50 per cent solution is especially recommended to aid in the exfoliation of necrosed bone; it will also disintegrate and dissolve small pieces of tooth and necrosed bone that may be felt after burring or curetting about the jaws. I use it on gauze for the first packing after such operations, especially in the antrum. Weaker solutions may be used to wash out after surgical operations on the jaws. I have come to look upon it as one of my most valuable agents.

Trikresol is another product from Schering's chemical laboratory. Its composition is as follows: Ortho-cresol, 35 per cent; meta-cresol, 40 per cent, and para-cresol, 40 per cent. It is a clear liquid with pungent odor, resembling phenol; turns slightly red on exposure

to strong sunlight; is soluble in 2 per cent water, but freely in alcohol and oils. It is a splendid germicide, as shown by these experiments, and an agreeable preparation to use. I have been employing it about four years, and now find I am using it in almost every condition where I formerly used carbolic acid or creosote. It is not so escharotic as carbolic acid; will penetrate much deeper into vegetable cells, and will destroy spores. Two per cent solution is antiseptic. I recommend it to burn out old abscesses; as a dressing in root canals in acute apical pericementitis; in putrescent pulp; to relieve odontalgia, applied warm or almost hot. It penetrates the dentin as readily as the essential oils, but does not discolor it. A little (not an excess) is useful as a dressing after pulps are extirpated, before filling root canals. To keep scalers and such instruments sterile while using, I put them in a ten per cent solution in alcohol and water. It is an excellent agent used full strength as a first treatment in pus pockets about the roots of teeth.

Kresamin is the name given to a combination of ethylenediamin and trikresol, containing equal parts of each. It is a reddish-colored, phenol-like liquid; has an agreeable odor, and is very slightly irritant. It is practically non-caustic and but feebly coagulant. It is powerfully germicidal, equal to 1 in 500 bichlorid of mercury. I have been using it lately in the clinic with most flattering results. I am satisfied if used in acute or recent chronic abscesses it will be of value. I wash through such abscesses freely with it. I have passed some around among a few of my dental friends, and they are all delighted with the results they are getting with it. It is freely soluble, and may be used as an antiseptic in dilute solutions. It is a chemical disinfectant. When brought in contact with thick pus kresamin seems to immediately dissolve it and turn it a dark brown color. In apical pericementitis from any cause it seems to be of great value; also applied to inflamed pulps it has an immediate quieting influence. In all inflammations accompanied with pus formation I am sure of its efficacy.

Chinosol has a chemical formula of $C_9H_6N.KSO_4$ and is prepared by the action of sulphate of potassium on chinolin, a basic coal tar derivative. It occurs in the form of a crystalline yellow powder, possessing a very slight odor and pungent coal tar taste. It is freely soluble in water but insoluble in ether or alcohol. It is a chemical germicide. When brought in contact with pus in the

slightly alkaline fluid of the tissues it is readily broken up into oxychlorin, and it is this that is so powerfully germicidal. So far as my knowledge goes it is the most potent germicide, so far as pus germs are concerned, of any agent at our command. I began using and recommending it for the eradication of pus in 1893, since which time it is my main standby. It has two slight objections, namely, it corrodes steel instruments (not others), and has a slight tendency to darken teeth, but such discoloration is very readily removed with any oxygen bleacher. Being almost devoid of odor it is not a very good deodorant for foul-smelling dentin, but as a pus-destroyer it certainly has no equal. It is practically non-irritating, wholly non-coagulant, and non-caustic. I use it in 2 per cent solution for washing out bad pus pockets, abscesses in antrum, and alveolus. I use a ten per cent solution in chronic, foul, violent abscesses, and all other violent suppurations. It is used only for the purpose of getting rid of pus. When you need to burn out necrotic tissue it is not recommended. It is wholly non-toxic, and can be used *ad libitum* in these solutions. Injected into a forming abscess, boil or carbuncle, it will immediately get rid of the pus. In any case of violent pus infection, where there is danger of serious results, this is the most efficient agent; especially in streptococcus infection which is active you can use no better drug. Chinosol gauze, absorbent cotton, and soap may be had in the market. If you have an abscessed antrum, where pus is rapidly being formed, try chinosol irrigation and chinosol gauze pack to control it and you will be delighted.—*Review.*

SALIVA AS AN INDEX OF FAULTY METABOLISM. By E. C. Kirk, D.D.S., Philadelphia. Read before the Fifteenth Anniversary Celebration of the Odontographic Society of Chicago, February, 1903. The matter to which I have the pleasure of asking your attention this evening is a consideration of some aspects of the process of nutrition in the human body, and particularly some aberrations from the normal nutritive processes which I believe to represent what has been called the constitutional factor or predisposing cause of some of the local disorders which as practitioners of dentistry we are called upon to treat.

In the study of the metabolic processes of the animal body whereby the ingested food stuff is converted to the uses of the organism, considerable information as to the nature of the process

at a given period may be derived from an investigation of the waste products produced by the chemico-vital process through which the pabulum has passed. The chemist by an examination of the products of combustion from a furnace can form a fair idea of the nature of the fuel used and learn something of the intensity of the process, the perfection of the combustion, the relative proportion of draft to fuel, and obtain not a little idea of the efficiency of the furnace itself, that is, determine its functional value as it were. The comparison of the animal organism to an engine for rendering kinetic the potential energy of fuel is not inapt and has been frequently used as an illustration of certain basal vital phenomena of the animal body.

In the study of cell metabolism we are at once confronted with problems which, though extremely complex, are nevertheless becoming more and more clear through the discovery that the fundamental principles of chemism and molecular physics are found to ultimately apply to the phenomena of cellular nutrition and growth even though these are profoundly modified in their expression by the as yet unexplained factor of vitality inherent in living substance. It is known, for example, that all living cells with possibly a few exceptions require oxygen for the performance of their vital functions, hence, notwithstanding the complexity of the chemical changes through which the pabulum required for the nutrition of the cell may pass, we are safe in concluding that oxygen is necessarily concerned in the process of cell nutrition, which is therefore in some stage or degree a process of oxidation or combustion of cell food. We know also that this vital combustion process, like that of the engine furnace, results in the production of heat, mechanical energy and waste products, and further, in order that the highest efficiency measured in terms of functional activity shall be attained, that not only must the proper kind of pabulum be available by the cell, but in order that we may have a theoretically normal metabolism there must be maintained a correct adjustment between the amount of pabulum which the cell can utilize and the quantity of oxygen needed for its combustion. Or as stated by Professor Verworn of Jena: "All organisms take only a certain quantity of oxygen even when more is offered, their consumption of it is not essentially increased in a medium of pure oxygen. Hence within certain limits living substance is fairly independent of the quantity of oxygen at its disposal,

but all organisms without exception require for their life a certain quantity of oxygen."

The analogy between the nutritional process and the combustion phenomena of the engine furnace falls short in at least one important particular which distinguishes the metabolic vital processes from that of the inanimate machine, viz., the process of combustion of fuel is essentially simple in character and consists either in the reduction of complex compounds to simpler forms of combination or in the case where the fuel is elementary in character, as in the combustion of carbon, the new compounds formed are of extremely simple constitution, while in both instances they are results of direct oxidation.

In the complex system of molecular changes which we group together under the term cell metabolism two distinct phenomena appear to follow the initial oxidation process: first, the building up of atomic groupings into compounds of the highest order of complexity —the proteids for example, and second, a reduction of a portion of the protoplasmic contents to compounds of simpler constitution. The process of metabolism is therefore both synthetic and analytic, but as in the case of ordinary combustion the metabolic process is also absolutely dependent upon a proper supply of oxygen, which element must be regarded as the initiative of the subsequent series of protoplasmic changes involved in the metabolic process upon which all that may be included in nutrition depends. The introduction of oxygen into the protoplasmic combination through the agency of the hemaglobin of the blood disks inaugurates a series of alterations in the protoplasmic mass, reconstructing it in various ways in the course of which its several vital phenomena are manifested.

I wish to avoid the creation of an erroneous impression in this connection, viz., that all of the metabolic changes in living cell substance are simply cases of oxidation; on the contrary we can safely attribute to oxygen only the power to initiate the complex series of chemical changes and cleavages which follow its combination with the protoplasmic mass. The subsequent cleavages of the mass in those directions which are necessary to normal metabolism, though initiated by oxygen, are by no means continued as oxidation processes. Oxygen, as it were, sets the metabolic process in motion, or as stated by Professor Michael Foster, "oxygen winds up the vital clock."

In the process of metabolism the cell pabulum undergoes a variety of complex chemical changes which for our present purposes it is unnecessary to follow, but in general we should note that its constituent elements are rearranged into new combinations whereby two important functions of the organism are served, viz., first, the production of those factors, physical, chemical and histological, necessary to the vital maintenance and growth of the organism, and second, the elimination of those factors unnecessary or hurtful to the organism.

Investigation has tended to more and more clearly establish the fact that has *a priori* for a long time been accepted, viz., that the nutritional process is distinctly within the range of phenomena involving the application of those great generalizations of science dealing with all molecular activity, the conservation of energy and correlation of force. And further when we come to study the chemical transmutations of the protoplasmic mass which are involved in the nutritional process we find that the law of definite ratios in the formation of new combinations applies to the chemistry of the cell as it does to chemical changes in general.

In any attempt therefore to conceive of a theoretically normal standard of nutrition we are compelled to take these data of molecular physics and chemistry into account. In fact, it is only by their aid that a good working conception of nutrition is possible, so that in the light of these general data we may say for our present purposes that nutrition is theoretically normal when the metabolic processes of a cell are so adjusted with regard to the conversion of cell pabulum as to develop the highest vital efficiency of the organism. This involves among other things the proper kind and correct amount of cell food, both of which in the first instance must be definitely proportioned to the capacity of the cell to utilize oxygen. Any lack of normal adjustment in these fundamental factors will create a defect in metabolism as quickly and certainly as a lack of correct adjustment between the draft and fuel will cause imperfect combustion in a Bunsen burner, for example.

It is the consideration of the vital phenomena flowing out of the interaction of the data referred to that constitutes the field of physiological study, but as we are confronted with multitudinous variations from the ideal conditions of nutrition we have for the sake of convenience in classification assigned to these variations a

special designation, viz., that of pathology, yet in the last analysis both classes of phenomena are essentially the same, their differences being those of kind and degree of metabolic activity.

The question of cell type as determining the nature of metabolic changes is important and interesting, for in the impress of heredity upon the cell protoplasm by which its activities are limited to the performance of certain classes of metabolic changes is involved the explanation of those inherited tendencies to disease which we call diathetic. But inasmuch as we may safely assume that the diathetic state before its transmission was originally acquired through a cell environment in which normal metabolism was permanently disturbed, we must recognize diathetic states which are acquired as well as hereditary, and we know as a matter of clinical observation that these acquired diatheses do occur as the result of nutritional errors in the kind or amount of food ingested when disproportioned to the cell capacity for the oxygen required to maintain a normal nutritional standard.

Michaels of Paris in his study of diathetic states, following the classification of Gautrelet, recognizes two grand divisions of abnormality in the nutritional process, the first in which the oxidations are in excess of normal, termed the hypoacid diathesis, and second that state in which the oxidations are less than normal, termed the hyperacid diathesis, the normal nutritional state being adiathetic. The diatheses are the prodromal states of active disease, the conditions of susceptibility, and they determine largely the character of the subsequent invasion or disease process.

Following Gautrelet, Drouin and Hugounenq, Michaels states that the hypoacid diathesis is the state of lympathism, an expression of vital overactivity in which the oxidations are overactive and the hydrations superior to normal, hence there is a decrease in organic acidity and an increase of saline chlorids excreted from the economy —"hypoacidity favors chemical changes in the tissue" (Duclaux) and the hypoacid individual is susceptible to contagious diseases (tuberculosis, syphilis, etc.). It is also the diathesis in which tooth caries is most manifest.

The hyperacid diathesis is the diathesis of arthritism and its nutritional processes are characterized by incomplete oxidation with as a consequence the formation of acid salts as end products of metabolism. Hence in this diathesis organic acidity is high. The

hyperacid diathesis is characterized by slowness in the biochemical processes of cell metabolism, the irritative acid end products eventually producing pathological manifestations such as gout, rheumatism, sclerosis, etc., and incidentally certain local dental and oral lesions such as chemical erosion of the teeth and probably predisposing to certain forms of phagadenic pericementitis.

It is important for the clear understanding of the succeeding portion of this discussion that the difference between the hypoacid and the hyperacid diathesis should be borne in mind, and especially the difference in the intensity of the oxidation processes as the basis of distinction between them.

Inasmuch as these diathetic states have been found to give rise to different groups of disease phenomena it becomes important that we should know all we can of the nutritional processes which in diathetic individuals are really prodromal to the disease phenomena which these cases manifest, and which are found to be in fairly constant relation to a given diathetic state. The light thrown upon this question by examination of the excretions, and heretofore especially of the urine, has contributed much to our knowledge of the nutritional process not only in health but in disease, and in the latter constitutes in intelligent hands one of the most important means of diagnosis. Study of the composition of the urine has given us a knowledge of the nature of the waste products of the nutritional process and by inference therefrom we have learned much about the metabolic changes of which these waste products are a result.

Michaels in several communications, but particularly in his paper presented to the Third International Dental Congress held in Paris in 1900, has directed attention to the importance of the saliva as furnishing a reliable means for the study of nutritional states and particularly emphasized its value as a means of diagnosis of diathetic conditions. Michaels contends that the composition of the saliva more accurately represents that of the blood plasma than does the urine for the reasons, first, that it is a secretion which is not modified in any important particular by the glands which separate it from the blood, as is known to be the case with the urine; second, the saliva, while it contains excrementitious substances is also a digestive fluid which ordinarily is swallowed as soon as it is separated from the glands which secrete it and so passes a number of times through the nutritional cycle, in doing which it picks up from the blood stream

those soluble crystallizable compounds which are end products or by-products of metabolism and which are dialyzable through the buccal glandular apparatus into the mouth cavity. Accepting these premises as trustworthy, Michaels' deduction that the composition of the saliva varies with the nutritional state is a necessary corrolary and the theoretical deduction has been amply borne out by laboratory and clinical investigation.

Two important generalizations are the outgrowth of the basal principle just stated, first, that the composition of the saliva is fairly constant for a given diathetic state, second, that it is also fairly constant for any period in a given diathetic state. We are therefore able from an examination of the saliva to determine with reasonable accuracy not only the general diathetic condition but the period of the diathesis, i. e., whether it be weak or advanced in its pathologic intensity.

The technique of salivary investigation in order to arrive at a complete understanding of the properties and composition of saliva in all of its diathetic variations is necessarily elaborate. It involves the study of the physical or organoleptic properties of saliva as well as its chemical composition; careful note is first made of its quantity, color, transparency, consistency, odor, sediments and any other characteristics which it may present. It is then subjected to the action of various reagents, to determine its reaction, the presence of chlorids, sulfocyanids, ammonia compounds, glycogen, etc., and finally specimens are slowly evaporated upon microscope slides for the study of its crystallizable constituents by means of the microscope and the micropolariscope.

My own studies of saliva have been mainly of specimens taken from individuals of the hyperacid diathesis, for which reason and because they present certain features of especial interest to us as dentists I shall ask your attention more particularly to them. Clinically we find that hyperacid individuals are those who are more or less subject to gout and rheumatism, migraine, various nervous phenomena due to general acid intoxication, various forms of nephritis or arterial sclerosis, and not infrequently they may present carcinoma or some form of epithelioma and leucoplakia. The teeth of such subjects are usually free from true caries but are attacked by erosion in some of its forms and often with interstitial gingivitis. They are generally overfed individuals of sedentary or

inactive habits, and their diathetic state is one always dependent upon incomplete oxidation in the process of cell metabolism. I have characterized these cases as overfed. I should perhaps be more accurate were I to designate them as improperly fed, for the reason that I regard the kind of nutritive supply as being fully as important as its amount.

My interest in this class of cases arose out of my studies of dental erosion, for it soon became evident that the frequent association of that disorder with the hyperacid diathesis had a significant bearing upon its etiology, and the search for the cause of the erosion of the teeth developed some interesting data bearing not only upon the phenomena of the diathetic state itself but upon the causes of certain disease conditions of which the general nutritional fault was the primal cause.

I have already reported in a paper before the Second District Society of New York some studies of erosion which I believe demonstrate the fact that at least one form of the disorder is due to a general lactic fermentation in the oral cavity and in which the teeth are generally attacked by the lactic acid solvent and are rapidly decalcified. These lactic-acid cases are, however, quite different in their clinical aspect from other cases of erosion found in typical hyperacid individuals, and in the paper referred to I ventured to suggest the necessity for a new classification of erosion cases into those in which the expression of the solvent action was general for all surfaces of all of the teeth, and another class in which the loss of structure was localized upon a few teeth and due to the solvent action of the acid mucus exuded from certain disordered buccal mucous glands. For this latter type of the disease I tentatively suggested the term graphic erosion as somewhat indicative of the almost hieroglyphic form which the eroded areas often presented. I further stated that my studies had led me to believe the solvent causing the loss of structure in these cases of graphic erosion was the dihydrogen sodium phosphate. I am able now as the result of further investigation to confirm that opinion.

In a paper presented before the Ohio State Dental Society in December last, I directed attention to a form of tooth dissolution frequently observed in the deciduous dentures of children overfed upon carbohydrate foods and in adult individuals of the hyperacid diathesis similarly fed which had been mistaken for rapid caries, but

which my studies of the mixed oral secretions had led me to believe was a process of rapid erosion due to unusually active production of dihydrogen sodium phosphate. I was led to this conclusion as to the etiology of the disorder by finding in the saliva not only large quantities of the acid sodium phosphate, but also the calcium compound resulting from its action upon the tooth structure as well. The mechanism by which this excessive production of acid phosphates is produced in the mouth I reported in that paper, but I desire for the sake of a clear understanding of certain other phenomena dependent upon the same diathetic fault to recapitulate it here.

As already stated, the hyperacid diathesis is characterized by a defect in metabolism by which the oxidation processes are inferior to normal. The intake of oxygen by the cell is apparently disproportionate to the pabulum which the cell is required to convert into its normal end products, and as a consequence the ratio of carbon dioxid to oxygen in the blood becomes greater than normal. Under ordinary circumstances a temporary increase in the ratio of carbon dioxid to the oxygen of the blood is corrected by the action of the renal epithelium, in which a reaction occurs between the carbonic acid of the blood and its contained basic phosphates as follows: $H_2CO_3 + HNa_2PO_4 = HNaCO_3 + H_2NaPO_4$. The mass action of the carbonic acid upon the alkaline sodium phosphate results in the formation of acid sodium phosphates which are eliminated by the kidneys and of sodium bicarbonate which is returned to the blood, the result being that the alkalescence of the blood plasma is maintained at the normal point. The same principle applies to the conversion of basic calcium phosphate into acid calcium phosphate under excess of carbonic acid in the blood plasma. When, however, the disproportion between the intake of oxygen and of pabulum by the cell is indefinitely maintained, as is the case in the hyperacid diathesis, the suboxidation with excessive production of carbonic acid becomes a chronic condition and the renal epithelium is no longer sufficient to maintain the alkalescence of the blood plasma by eliminating the excess of acidity as acid phosphates, so that under the stimulus of the high carbonic acid content of the blood plasma other epiblastic structures take on the function of acid phosphate elimination which is normal to the renal epithelium, and exude an acid fluid instead of a normally alkaline secretion.

Among the epiblastic structures thus irritated into abnormal

function are the buccal mucous glands, which under the diathetic conditions stated exude a mucus containing large quantities of acid phosphates of sodium and calcium, which exert a localized solvent action upon the tooth surfaces in contact with the orifices of the disordered glands and produce the wasting of tooth structure which we know ordinarily as dental erosion. It is significant also in this connection that the glands themselves in the course of time become hypertrophied to an extent which in old chronic cases makes their form at times plainly visible in the tissues of the under side of the lip. The dermal epithelium and sweat glands in these cases frequently exude the same acid phosphates, giving rise to eczematous eruptions.

It would seem obvious that the mechanical or operative treatment of dental erosion is in the light of its etiology practically futile if its recurrence is to be avoided. It is hopeless to attempt to permanently correct the local lesion until the constitutional fault has been eliminated. The critical study of this problem has led me to the careful investigation of both the saliva and the urine and to some extent the study of the blood in these cases, with the hope of discovering the nature of the nutritional error as a first step toward its correction, and I now ask your attention to some of the results thus far attained.

Recalling to your minds the fact that the basal characteristic of the typical hyperacid individual is his diminished power of oxidation leading to the relatively increased production of carbonic acid, which in turn converts his basic phosphates into acid phosphates, we have as a result the rapid and continuous elimination of phosphorus from the system—for the reason that the acid phosphates are extremely soluble and have a higher osmotic tension than the basic phosphates, hence they are carried off by the kidneys in large quantity, developing a true phosphaturia or so-called phosphatic diabetes, a disorder which has been clinically described by Teissier of Lyons, France, and Ralfe of London.

As before stated, the skin and buccal mucous glands in these cases also contribute to the loss of phosphates until in time the patient becomes phosphatically starved and presents certain evidences of ill health; he becomes neurasthenic, irritable or despondent, or may manifest other forms of nervous irritation, i. e., migraine cerebral hyperemia or hysterical phenomena. The loss of phos-

phates continues until a point of depletion is reached where they are found only in minute quantity in the urine or the saliva. At or just previous to this period triple phosphates and oxalates appear in both saliva and urine and the nervous irritability is markedly increased, the malnutrition being further manifested at this period by a comparatively rapid loss of weight. Later acetone and diacetic acid make their appearance in the secretions along with creatin and in some cases cystine, at which period profound mental torpor, at times almost amounting to coma, is not infrequently manifested, or there may be extreme nervous irritability, amounting almost to hysterical mania.

Coincident with the loss of phosphates in the later stages of the disease, a loss of available nitrogen occurs, not as urea, uric acid or ammonia, but of nitrogen in combination with carbon as a cyanogen radical, in which condition it should have normally entered the nutritional cycle for the uses of the bodily economy, but which is sidetracked, as it were, and lost by combination with the acid phosphates eliminated by the kidneys and the other excretory structures already referred to.

Loss of nitrogen in cases of acid toxemia has already been recognized by several observers, the chemical mechanism of the process having been explained upon the assumption that nitrogen as ammonia was lost in neutralizing the acid end products of metabolism in the blood stream. I have, however, experimentally determined that it is nitrogen, not as ammonia but as ammonium cyanate, a probable forerunner of urea, which is thus lost in the cases of faulty metabolism constituting the hyperacid diathesis; a much more important matter when the biogenic function of this form of nitrogen is taken into consideration. Evidences of imperfect oxidation of proteids are also manifested in the saliva and urine by the presence of lactates of ammonia and of calcium, creatin, acetone and oxalates with increase of urates of ammonia and amorphous urates; the urine also frequently contains indican, especially in cases complicated with disordered liver and habitual constipation. The saliva is usually constantly acid, due to the presence of acid phosphates, and the dental lesions are ordinarily erosions, or when the acidity is absent, pyorrheal invasion of the peridental membranes.

Many of these cases in the later stages develop epithelioma or leucoplakia buccalis or both together, and in view of the fact that

in certain types of the diathetic condition under consideration the constant exudation by the epiblastic tissues of acid phosphates and other irritant waste products of faulty metabolism is a characteristic feature, it does not seem to be an altogether groundless suspicion that these irritating exudates may be an etiological factor in the production of the morbid growths referred to.

The data upon which I have based the analysis of the conditions I have here attempted to describe were obtained through the methods of study and observation promulgated by Dr. Michaëls, and I am especially indebted to him for his valuable methods of technique which have been of incalculable service in the study of this complex problem. I shall at the conclusion of my paper endeavor to demonstrate to you some of the more striking features of the technique by means of the micropolariscope, so that you may be able to see some of the characteristic reactions of certain of the crystalline waste products of faulty metabolism in the hyperacid diathesis.

Before dismissing this phase of the subject I desire to say a few words concerning the therapeutic aspect of the question. I will ask you to bear in mind that I have limited my studies thus far to a distinct class of cases, viz., arthritic, in which the elementary fault of nutrition is unquestionably a diminished power of oxidation with excessive production of carbonic acid as the result thereof, and as a secondary consequence the excessive production of acid phosphates together with a variety of toxic waste products from the imperfect oxidation of proteid food. In the treatment of these cases I have aimed not at the objective symptoms but at the correction of the metabolic fault. The diet has been so regulated as to reduce to a minimum the intensity of the demand for oxygen, and to that end carbohydrate foods have been as nearly as possible eliminated from the dietary in the early stages of treatment. Succulent vegetables, gluten bread, milk, albumen, and a moderate ration of proteids in the shape of fish, oysters, game, light meat of fowls, etc., have been allowed. For medication my best results have been obtained by the continuous administration of small doses of phosphorus or of arsenic iodid along with the glycero-phosphates of lime and soda. This regimen in connection with correctly adjusted exercise and rest and attention to general hygiene has yielded most marked and satisfactory results. A chronic case of typical hyperacid diathesis, neurasthenic to a high degree, great loss of bodily and mental power,

pronounced acid intoxication, acetone in both saliva and urine, the latter loaded with acid calcium and sodium phosphates, general debility so great as to make a skilled attendant a necessary domestic fixture, I have had the satisfaction of seeing improve under four weeks of the treatment described so that the attendant is no longer necessary, and the patient is taking vigorous physical exercise, attending daily to business for several hours, and the whole physical and mental status indicates a progressive and comparatively rapid return to health. Examination of the urine shows a decrease in specific gravity of from 1034 at the beginning of the treatment to 1016 at present, absence of acetone and of acid phosphates beyond normal, and what is of especial interest, almost entire cessation of abnormal loss of nitrogen.

I have taken the liberty of presenting this subject for your consideration because it is my belief that it involves the problem which we must next attack if we are to accomplish what is expected of us in the treatment and cure of certain conditions that we have claimed are strictly within the province of the dentist to treat and cure. I am convinced that the constitutional factor must be reckoned with and combated in some of the most common mouth and teeth lesions which daily come under our care, as for example, dental erosion, phagedenic pericementitis, probably dental caries, and certainly various neoplasms and morbid growths of the soft tissues of the oral cavity. I am strongly of the opinion that the study of faulty metabolism is a field that is of equal if not greater importance for us to become familiar with than is bacterial pathology, for it is beginning to dawn upon our minds that good health is the best guarantee against bacterial invasion and that it is faulty nutrition which is mainly the prodromal condition of infection. The building up of the natural bodily defenses by establishing normal conditions of nutrition is not only the true prophylaxis but it is in a very evident sense the only rational basis of therapeutics.—*Review.*

PATHOLOGICAL LESIONS OF THE DENTAL PULP, AND HOW TO TREAT THEM. By Geo. W. Cook, B.S., D.D.S., Chicago. Read before the Southwestern Michigan Dental Society, April 8, 1903. It is important to realize that the normal pulp of a tooth is a complex and delicate structure, incapable of creating new forces, but capable by means of a cellular and molecular organiza-

tion of accumulating or storing up energy derived from nutritional sources. This phenomenon is accomplished under fixed and definite conditions, but let some irritating agent come in contact with this highly-organized structure, and the functional activities will be changed from a normal to an abnormal performance of certain of its functional processes. This at first may or may not be associated with any appreciable morphological changes of the cell structure as a whole, but if these agencies and conditions are such as to make it possible for the pulp to adapt itself to these irritating influences there will be induced a functional aberration and structural alteration, thus bringing about many of the well-known manifestations of disease of this structure. It is these functional abnormalities and structural alterations that make up the signs and symptoms which indicate that the part has passed from a normal to a pathological process. The functional activity of the pulp may be slightly diminished or exalted, the action of certain cells of this structure may be perverted or abolished, or they may now and then revert to forms and phases of activity that they long since have outgrown or suppressed in its slow adaptation to the conditions which constitute the normal life processes of the part. All of these processes are looked upon as degenerative changes which have been induced by some external agent, which at the present time is looked upon as bacteria and their products.

When bacteria approach near enough to the pulp its cell activity is indicated in three changes: First, the retrogressive or degenerative; second, proliferative or regenerative; third, necrotic changes or complete death. When this last-named stage has been reached the dead or necrotic portion of the pulp becomes inhabited by bacteria, and a process of decomposition is set up which results in the formation of certain basic substances known as ptomains. It is a well established fact that many of these ptomains are physiologically inert. Brieger has called attention to the fact that oxygen is one of the necessary elements to the poisonous bases; still, on the other hand, a non-toxic ptomain is formed when freely supplied with oxygen. It has been shown that the poisonous ptomains begin to be formed about the seventh day after putrefaction has appeared, and disappear again if putrefaction goes on.

In the pulp chamber we can suppose that this putrefactive process brings about a number of these basic substances and that it is capable

of setting up an irritative process at the apical end of the tooth. It is ordinarily understood that but few of the bacteria which are capable of setting up disease processes are capable of producing a putrefactive process in dead animal tissue. The liquefactive changes that are set up in the pulp chamber are caused usually by a bacillus that was isolated from decomposing pulps by Arkovy. This microorganism can hardly be classed among the so-called pathogenic germs, but at the same time if it is permitted to grow and induce putrefactive changes in the pulp chamber, and its products are permitted to be absorbed by the cells surrounding the root of the tooth, it is capable of causing alveolar abscesses.

It is a well-known fact that a sharp line can not be drawn between the so-called pathogenic bacteria and those germs that cause putrefaction. Where the pulp is permitted to undergo a putrefactive change, excluded from the air, this microorganism has very much less virulent properties than when the pulp chamber is open. Under these conditions when the pulp has undergone decomposition, excluded from the free oxygen of the air, several different changes take place which are in many respects different from those in which the free oxygen of the air is present. But suffice it to say that there are three basic substances which appear in the decomposition of the pulp, namely, cadaverin, putrescin and neuridin, and it has been found that this first-named base will in the absence of bacteria cause the formation of pus, and any one of the other named agents has an irritating action on many of the cells of the animal body. So that when the pulp has been undergoing decomposition from five to ten days the cells around the root of the tooth have been more or less affected by these three last-named substances; the microorganisms have increased their virulent properties according to the oxygen they have obtained.

This bacillus of Arkovy when grown in the absence of free oxygen of the air will produce a more virulent ptomain but has less virulent properties within itself, and when the free oxygen of the air is permitted to come in contact with the culture it will soon take on the power of setting up an acute inflammation and suppuration. These pathological lesions of the pulp will vary according to the condition under which the process has been established; so if a tooth presents itself with a decomposing pulp of a few days' standing, allow as small an amount of air to pass in as possible. The

treatment should be to not allow a mild oxidizing agent to go inside the pulp chamber, but there should be a strong bactericidal agent used, and it should be put in as soon as possible after the tooth has been opened.

Here it will be well to call your attention to a few facts concerning what is understood by a bactericide. It is an agent that will cause the death of the bacteria, without, as far as is possible, acting upon the tissues that the bacterial cell is inhabiting. For beyond question there is one or both of the first named changes (retrogressive or proliferative) going on, which may be said to be in most instances in a state of susceptibility, and the bacteria are in a more or less virulent condition. So it is possible that many of these pathological processes may be established around the tooth. The method of treatment is to ascertain as far as possible how long the putrefactive process has been going on, and as to whether this has been going on in the presence or absence of the free oxygen of the air and the moisture of the tooth. If the pulp chamber has been closed it is best to use an agent like thymol or some of the cresol group, which are metacresol, orthocresol or paracresol. But the tricresol is preferred to any of the others just named. The cresol compounds are more active on the forms of bacteria that cause putrefaction than on those so-called pus-producing germs. Where the active pulp decomposition has been going on in the presence of the free oxygen of the air and the moisture of the mouth chinasol would be given first place.

The reason for discriminating between these various agents and the conditions under which they should be used is because of the liability of discoloration when putrefactive changes of the pulp take place in a closed pulp chamber. There is considerable sulphuretted hydrogen contained within the pulp chamber, and the cresol compound has but little effect in giving rise to any chemical agent that will cause discoloration of the tooth structure, while on the other hand the chinasol will bring about various chemical compounds whereby the dentin of the tooth is made to reflect certain shades of darkness, thus establishing a discoloration that is not always easily gotten rid of. In the case of discoloration from the use of chinasol I have found no agent that gives better results in bleaching out the discolored dentin than sodium dioxid. In the use of chinasol in anterior teeth it is well not to allow it in any way to come in contact

with iron or steel, owing to the fact that it invariably turns black, due to a process of oxidation. The same chemical change apparently takes place when it comes in contact with blood, especially blood that is highly charged with carbon dioxid, a condition that usually exists in the early stages of the putrefactive processes of the pulp. In the more advanced stages there are to be found various compounds of sulphur, which react very quickly to a highly-complex molecular containing carbon; and in the case of chinasol we have a very complex molecular structure. It may be said, however, that the disinfectant properties of this agent are due to the readiness with which the molecule passes into solution, and some element therein contained readily attacks the bacterial cell and destroys its functional activity.

Owing to the fact that we have a complex rearrangement of the organic elements in the decomposition of the tooth pulp, and that we have a highly chemical organization in this bactericidal agent chinasol, it would be well to use some other means of disinfecting the pulp chamber where there is present a pulp in the active process of decomposition. At the present time I know of no agents that will give more universal results than some of the derivatives of the coal or wood-tar preparations from which the cresols, guaiacol, and other less poisonous compounds are obtained in greater quantities than the phenol, and dioxindol benzol. The three cresols above mentioned are less poisonous to the higher cell organization and less irritating to tissue structure, but have a very active bactericidal action on those forms of microorganism that cause rapid destruction of dead organic matter. Thymol is closely related in its chemical formula to carbolic acid, and is very soluble in water, and experimentally and clinically it has proven more valuable than carbolic acid. Guaiaquin ($C_6H_4O_2CH_2HSO_6$) or ($C_{20}H_{24}N_2O_2$) is a yellow acid salt very soluble in water and alcohol, and can be used to great advantage in the pulp chamber where decomposition is going on.

It must be borne in mind in the treatment of a tooth in which the pulp is undergoing putrefactive changes that there are a great number of chemical changes taking place from hour to hour, and the nearer we come to an understanding of the state of this putrefactive change the more intelligently can we treat the tooth with a view of preserving the translucency of its structure.—*Register.*

A FACTOR IN THE CAUSATION OF IRREGULARITIES OF THE TEETH. By J. Sim Wallace, M.D., D.Sc., L.D.S., England. A factor of distinct and general importance in the production of irregularities is the length of the neck. As extremes may be mentioned the long, thin-necked types, generally with prominent, narrow nose and receding chin, and on the other hand, the short-necked, stout, or square-built types, with broad jaws and rather prominent chin. Perhaps it may be doubted if the generalization that a long or a short neck should as a rule be associated with the other characteristics given respectively above, but a fair amount of observation will convince anyone that such an association exists. Moreover, the truth is already recognized by artists in their portrayal of the delicate and diseased compared with the muscular and healthy. Normal variations within limit are of course to be expected, and the effect of such limited variations may be negligible as regards their influence on the dental arches; but marked extremes, usually the result of abnormal environment resulting in disease, cause corresponding abnormalities in the arrangement of the teeth. As illustrations of the long-necked types we may take the flat or narrow-chested consumptive, and of the opposite extreme, the hunch-back. In the former the chin is generally receding, in the latter it is as a rule somewhat prominent and may even be "under-hung." A condition which often obscures the relationship between emaciated states and the results which it brings about in the dental arches is the fact that protracted emaciation during the developmental period may be succeeded by something approaching obesity in later life. In such cases the results of the emaciation in youth may be indelibly stamped on the dental arches however much it may be obscured in later life by a layer of fat. Similar to this is the fact that in later life the tongue may enlarge without being able to produce similar effects to those which usually occur in early life.

It will be observed that a consideration of these facts makes it necessary to find the explanation. The anatomical relations should be borne in mind, and especially it should be noted that the tongue has the hyoid or os linguæ for its base or foundation. Now, if the hyoid is continually dragged downwards, so, too, the whole tongue will be dragged downwards. When the lungs and chest are not well developed and when the general health is below par, the ribs tend to fall. The muscles used in forced inspiration are seldom called

upon, and their contractions are hardly what they should be in a state of health. If the ribs and sterum fall on account of such conditions as have been alluded to we get a long neck, and there is directly and indirectly an abnormal and continuous strain on the hyoid which ultimately displaces it downwards. The concomitant effects of the small tongue, or depressed tongue which is so far its equivalent, become manifest. This no doubt largely explains the relatively greater frequency of irregularities in females of the upper classes, as among them the arms and muscles of the chest are not well developed from lack of exercise. It is not only by way of the base of the tongue that this drop in the position of the thorax brings about its effect on the jaws. To a certain extent no doubt a slight strain is thrown on the skin, and a similar effect is produced to what may be brought about by the drag of the skin brought about by a cicatrix.

If a continuous drag is made on the hyoid and lower jaw on account of the depressed position of the thorax then we have a predisposition to open mouth and mouth-breathing. In a state of rest the jaws are not firmly closed, but a small interval exists between the dental arches. When increased tension is made on the lower jaw the space between the dental arches is of course increased. These facts account for the observation that contracted jaws often occur without blockage of the nasal passages. No doubt, too, mouth-breathing may predispose to adenoids and the train of evil effects produced by them. All this is of much importance on account of its bearing upon its prevention and treatment.

Very different is the effect when the health is vigorous, and when athletic exercises augment the muscles of forced inspiration, and the lungs and the thorax are well developed. Here we have no undue drag upon the hyoid. Indeed the structures which go to form the thick neck tend to press the mandible forward and stimulate its development in that position. Good health and vigorous activity allow all relations to be well maintained, or tend to make them so if they originally were not.

We referred to the case of the hunch-back. Here the upper thoracic ribs are forced upwards, the distance between the sternum and hyoid is abnormally small, the tongue is thrown forward, the neck is abnormally thick, and actual protrusion of the mandible or under-hung jaw may be brought about. But although a short thick

neck predisposes to the under-hung jaw it may come about from quite other causes. Generally it is due to an initial backward deflection of the upper central incisors by temporary teeth. With this initial difference observe the course of events. The lower teeth are somewhat protruded and the upper teeth are correspondingly pressed backwards. Now, therefore, we have the upper central incisors wedging between the teeth and the tongue, so as to force the central incisors and the alveolus, and then the lateral incisors of the lower teeth forward, while succeeding teeth from above come down to wedge out the inferior arch of teeth. Ample room is thus provided for the lower teeth, while the upper teeth are cramped and retarded in their eruption. The lower teeth thus take up a position outside and more anterior than the upper teeth and the lower jaw may be still further pulled forward by the action of the inclined planes of the cusps as well as by the forces above described.

The edge-to-edge bite, although sometimes supposed to be produced from similar causes to those which produce the underhung jaw, is as a rule etiologically totally unrelated. In this form of occlusion the lower jaw is in the first instance thrown forward voluntarily, so as to crush the food between the front teeth. Partly by pressure and partly by wear the incisive edges come to have a horizontal and flattened surface. The curve downward of the molars and bicuspids for similar reasons becomes obliterated and the cusps are worn away. This form of occlusion therefore can be expected only when mastication is excessive and the food of a quality which will subject the cusps to considerable wear.

We may now allude to current ideas such as are exemplified in Mr. Tomes' views on the causes of the underhung jaw and the edge-to-edge bite. Referring to the former he says, "The cause of this want of proper relationship between the upper and lower jaws and their respective teeth is in many cases very obscure. In certain families it occurs as a hereditary character. In other cases the deformity may have been consequent upon the relatively tardy eruption or the inverted [*sic*] position of the upper teeth in infancy."

The allegation that it is hereditary in certain families is of course no explanation. It merely amounts to saying that we don't know what produced it in the parent and the very same thing produced it in the child. With regard to the "other cases" he gives us no hint of what may have caused the tardy eruption or the "inverted" posi-

tion of the upper teeth in infancy, nor in what way such tardy eruption or "inverted position in infancy" could bring about the deformity. Mr. Tomes gives a quaint and characteristic explanation of edge-to-edge bite—he says that "it may be regarded as differing only in degree from those cases in which the upper front teeth are inverted, and as dependent upon similar causes which have operated with less force." This explanation is therefore "very obscure."—*Record.*

RECURRENT SEPSIS IN ROOT CANALS. By G. S. Junkerman, M.D., D.D.S., Cincinnati. The longevity of pulpless teeth has been a subject of much debate and applied statistics. The debate has led to difference of opinions and the statistics based upon obscure investigations have necessarily resulted in faulty conclusions. Where conditions vary in different individuals as they do we are usually a long ways from a correct prognosis. Doubts as to the usefulness of pulps in teeth of healthy condition have long since given place to assurances that they are the center of life and the nutrient supply to enamel and dentin, and death of the pulp means a like condition to these hard tissues. A pulpless tooth therefore has but one tissue that is alive, namely, the cementum, which depends upon the pericemental membrane for its vitality. Should the pericementum be destroyed the tooth becomes truly a dead organ and must be eliminated from the animal economy. These are all undisputed facts, a review of the same being entered into here for the purpose of more clearly defining our position in regard to the subject of this paper. A tooth that has lost its pulp becomes a cripple and is a bad subject of risk for the reputation of the dentist, because its vital power of resistance to disease has been diminished just as a one-armed or one-legged man becomes a more hazardous risk to the insurance company, because he is not as well equipped with the weapons of defense and means of locomotion to keep out of harm's way.

There is just one result to be struggled for in root work, and that is the healthy preservation of the pericementum. Any method that tends to injure this membrane is faulty. The use of any medicament or method that cannot be so controlled as to preclude the encroachment upon this membrane should be discarded as defective. The indiscriminate pumping of chloro-percha or hot wax, or the

jamming of warm gutta-percha into root canals without any previous regard to the surrounding tissue cannot constitute the act of a thoughtful professional man. This is a case where we should precede our cart to market instead of following it. The first aim in root work should be to secure the perfect sealing of the apical foramen without obtruding a foreign material of any kind beyond the extreme limit of that foramen. The material that is placed here must also be not only of a non-irritant nature, but should have healing qualities to soothe the torn and lacerated parts that must so often necessarily result from the extirpation of the pulp. It may be asserted that this is too difficult a feat to accomplish. This may be true, but it should be the aim of all to seek after the ideal because even then we fall low enough.

In cases of necrosed bone a removal of part of the disease only aggravates the condition. The surgeon aims to scrape down so as to get a well defined line between the healthy and unhealthy tissue; so in root-canal work we must separate with great accuracy the external healthy tissue from the internal dead root canal. If you go beyond the line additional diseased tissue is produced. If you retreat from the line you have a pocket which makes a supply and coaling station for the inimical host. The various root-canal filling materials tolerated by the profession are usually not used but abused. It is of very little moment what we use to fill root canals, if the apical foramen is sealed and with the correct material. In the most perfectly sterilized root canals recurrent sepsis is brought about by disregard of these two principles. I do not contend that these two principles can always be maintained, but in proportion as such is not the case is the prognosis bad.

Root canals should always be opened thoroughly so that we may see and not only feel the apical foramen. This may be done with a root-reamer without fear of breaking off the drill if you avoid jamming it. The material used to seal the apical foramen should have some well defined qualities. It should be germ-proof in itself, slightly antiseptic, and at least non-irritant. Cotton is the only germ-proof material known, as evidenced by the use made of it by the bacteriologists. A former method of filling the apical end of a root with cotton saturated with carbolic acid no doubt owed much of its virtue to this quality possessed by cotton, and I believe to-day that this method is superior to that of pumping chloro-percha into the

roots without regard to the apical foramen. A long experience with what I call the T. I. C. mixture leads me to believe that it is the ideal filling material to use for sealing the apical foramen. It is composed of cotton, tincture of iodin and tannic acid. A small thread of cotton on the end of a smooth broach is saturated with tincture of iodin; this is then dipped into pulverized tannic acid and it is ready for introduction, which is done in the usual way. The rest of the root can be filled with gutta-percha, cement, or anything desired. It may be asserted that this is going back to old methods of filling roots with cotton. This statement cannot be substantiated, as the mixture of these three ingredients forms a new substance which becomes as hard as cement. The iodin and tannic acid have a chemical action upon the cellulose in the cotton, forming a new compound. This can be readily proven by taking a ball of cotton, saturating with iodin and tannic acid, pressing out the surplus liquid and laying it in the sun to dry. So if you say that you fill roots with cotton by this method you tell only part of the story. The cotton acts as a germ-proof, the iodin as an antiseptic, and the tannic acid to tan into leather any organic tissue that may not have been removed by the broach. The entire mass forms a new compound which hardens in a short while, and you have an ideal material under perfect control for filling the apical foramen of a pulpless tooth.—*Summary.*

OSTEO-MYELITIS OF DENTAL ORIGIN IN THE INFERIOR MAXILLA, COMPLICATED WITH TIC DOULOUREUX OF THE LOWER LIP. By Dr. Lebedinsky, Paris. (*Archives de Stomatologie—Cosmos*). The anatomical divisions of bone into periosteum, medullary substance, and the true osseous substance has its application in the pathology of this variety of connective tissue. The inflammatory lesions of bone are known under the names of periostitis, osteitis, and myelitis, according to whether the periosteum, the true osseous substance, or the medullary substance is affected. When the inflammation of the osseous substance is concomitant with that of the periosteum the lesion is known as osteo-periostitis. When the inflammation of the osseous substance is concomitant with that of the contents of the medullary canal it is known under the name of osteo-myelitis; but this classification, the author states, while being applicable to the long bones, can

scarcely be applied to the flat or short bones, as the macroscopical structure of the latter is not the same as that of the long bones; in fact, in those bones, at least under ordinary observation, neither medullary canal nor narrow substance can be seen. This absence of marrow substance in flat bones explains why inflammatory lesions of the maxilla have been for a long time given under the term osteo-periostitis, and not under that of osteo-myelitis. The term osteo-myelitis was for a long time applied to inflammatory lesions of long bones, which, as is well known, possess a medullary canal filled with medullary substance. Later on the name osteo-myelitis was applied to a special disease of infancy and adolescence having relation to the development of the skeleton; but histological and anatomo-physiological researches have modified our conception of osteo-myelitis, for although the macroscopical structure of long bones be different from that of the flat or short bones, the same is not the case with the microscopical structure. After giving a description of the histological structure of the marrow substance in long bones Dr. Lebedinsky states that that substance in the flat or short bones —which, as is known, do not have a medullary canal—is disseminated in the spongy tissue, in the Haversian canals of large caliber, in the nutrient canals of the compact tissue, and upon the internal surface of the periosteum. If we admit that the inflammatory lesion of the long bones can be periosteal, osteo-periosteal, and osteo-myelitic, such lesion of the maxilla, considering the particular disposition of its medullary substance, cannot present the same pathological evolution. "The inflammatory lesion of the maxilla is osteo-myelitic from the beginning."

After these preliminary remarks upon the histology and inflammatory lesions of bone the essayist reports the case of a man, aged forty-two, who was suffering from a severe disturbance of the lower jaw. The patient had suffered for a long time from toothache, and on that account had the second and third molars extracted. The dentist did not succeed in extracting the roots of these teeth, which he allowed to remain in the jaw, telling the patient that in time they would be exfoliated. The patient was only temporarily relieved, and as the pain reappeared the day after these unsuccessful extractions he consulted another dentist, who after several attempts succeeded in extracting the roots that had been left in the jaw. The same evening the patient had a chill and suffered excruciating pain

on the right side of the lower jaw. Two days afterward the swelling of this region was so great that it interfered with opening the mouth. A physician was then called in consultation, but his treatment did not in any way relieve the symptoms. The patient then consulted his family physician, who referred him to Dr. Lebedinsky, who found an enormous swelling upon the right side of the lower jaw and upon the entire right subhyoid region. The skin covering this tumefaction did not present any special characteristics. The appearance of the patient was slightly cyanotic. Slight pressure upon the swollen tissues produced intense pain, the maximum pain corresponding to the place where the body of the lower jaw unites with the ascending ramus. A digital examination of the vestibule of the mouth revealed a swelling upon the ridge of the jaw which corresponds to the region from which the teeth had been extracted. The slightest pressure on this swelling produced an intense pain. After this incomplete examination Dr. Lebedinsky concluded that the patient was suffering from an osteo-myelitis of the lower jaw, caused by an infection of the alveolar wound. (Regarding the diagnosis of this affection, the writer states that a painful swelling of the vestibule of the mouth is a characteristic symptom of osteomyelitis.) The treatment consisted in lancing the swelling, an operation which was followed by the exudation of yellowish creamy pus of very offensive odor. The wound was then irrigated with a solution of mercury bichlorid 1 : 1000 and packed with iodoform gauze. The next day a slight improvement could be noticed. The operator succeeded in opening the mouth with a mouth-opener, when a thorough examination of the wound was made. The appearance of the region was extremely bad. The wound was filled with fragments of gum tissue, food débris, and dead osseous lamellæ, all bathed in pus. The operator performed a thorough curetting of the alveoli and washed out the wound with the bichlorid solution. After this treatment the patient improved, but continued to suffer pain, and as this condition persisted another examination was made of the region around the angle of the jaw. This revealed the presence of a movable piece of necrosed bone. It was not thought advisable to remove the sequestrum, as in so doing the vessels and nerves of the region might be injured. A few days afterward the sequestrum, perfectly loose, was removed with a pair of pliers.

Dr. Lebedinsky gives a description of the sequestrum and calls

attention to the interesting feature presented by its internal surface, in which could be seen a deep canal the floor of which was partially absent. This canal, the author states, was the inferior dental canal, which gives passage to the inferior dental nerves and vessels. If the canal had been complete, that is, if the floor had not been partially absent, the sequestrum could not have been removed without injuring the above-mentioned nerves and vessels, but as the floor of the canal had probably been the seat of inflammatory lesions it broke away during the process of removing the necrosed area. After removal of the sequestrum antiseptic irrigations were carried on during a few days, but notwithstanding the fact that the wound was healing rapidly the patient continued to complain of pain in the lower jaw and upon the right half of the lower lip, comparable to the feeling incident to the passage of an electric current. Some time later he returned complaining of pain in the same area, though less intense. When the patient lay upon the healthy side of the head he felt perfectly comfortable, but suffered distress when lying upon the diseased side. The contact of sugar with the alveolar border provoked a burning sensation in the lip. The contact of food produced very slight, or almost no pain. The painful paroxysms occurred on especially humid days. During all this period the lip had not presented any inflammatory lesion. The author is hence of the opinion that the disturbance is neuralgic in character, or that it may be a case of tic douloureux. It is almost certain that the inferior dental nerve suffered a neuritis which extended to the mental nerve. In explanation of the localization of the neuritis upon the mental nerve, the author says it is probable that the position of the dental canal permitted pus to remain in contact for a longer period with the terminal branch of the inferior dental nerve, and for that reason the pathological changes in the mental nerve were more intense. It is probable that the irritation of the alveolar border was transmitted by the dental nerve to the mental branch, this causing the burning and electric sensation referred to. The author concludes his paper by stating that his future treatment will consist in cauterizations of the alveolar border with the thermo-cautery, in order to destroy the cicatricial tissue that might be a starting-point of tic douloureux, as has been shown by Dr. Jarré.

ABNORMAL FORMATIONS OF BLOOD-VESSELS IN THE HARD DENTAL TISSUES. By Dr. Perez Hirsch. In the course of researches on the distribution of vessels in the teeth Lepkowski found in rare cases in animal as well as human embryos anastomoses between the pulp vessels and the vessels externally surrounding the tooth germ. These anastomoses were produced by a branch or bundle of branches coming from the pulp vessels and piercing the developing dentin and enamel. "Formations of cicatrices" on the later surfaces of completed teeth in the form of funnel-shaped depressions, and at the same time strongly-increasing "density" of the dentinal tubes at the level of these depressions, according to Lepkowski, are to be taken as last indications of such vascular channels which had previously been in a stage of development. An extremely rare occurrence, the persistence of such a channel in a perfect tooth, as quoted by Lepkowski after Scheff, has been observed by Thiel. In this case, after the extraction of the first upper premolar of the right side, severe bleeding set in, which after minute investigation turned out to have *originated in a bundle of vessels on the lateral wall of the alveolus, which penetrated the tooth at its neck and went straight through the dentin into the pulp.*

In view of the extreme rarity of similar occurrences the following case which I had the opportunity of observing in November, 1902, may perhaps claim special interest. L. L., aged 42, came under my treatment on November 1, 1902, in consequence of an acute pain in the first lower premolar on the left side. By the statement of the patient I succeeded in establishing that the diseased conditions of the tooth had begun three months before with a pulpitis, at which time, however, the patient had not considered it necessary to consult a dentist. It is noteworthy that, according to the patient, he always had the impression that the pain had started in a very small hole in the tooth, much below the gum, between the diseased tooth and the cuspid next to it. These symptoms disappeared after about four weeks. After an interval of about two months, however, fresh pains set in, which caused the patient to seek the assistance of a dentist. The examination showed an acute periodontitis of the first left lower premolar. The hard dental tissues, as far as accessible to examination, seemed to be quite intact. At the desire of the patient the tooth was extracted. Minute examination of the tooth, which on

first superficial observation seemed to be quite sound, gave the following startling result: On the mesial surface of the tooth, at a level equal to exactly half the distance between the highest point of the masticating surface and the apex, at double the distance from the lingual surface as from the buccal surface, there was a nearly round, sharply-marked opening, the vertical longitudinal diameter of which measured one millimeter, whilst the transverse diameter measured three-fourths of a millimeter. This opening formed the external orifice of a channel of the same width which, running vertically to the longitudinal axis of the tooth, crossed the same in the mesio-distal direction with very slight curvature towards the lingual side, across cementum and dentin, disemboguing into the pulp cavity. The sides of the channel were formed by sound dental tissue. The channel itself was empty. On very close examination the part of the mesial surface of the tooth at a width of about one millimeter round the external orifice of the channel was found to be without lustre, slightly excavated and uneven. As to the condition of the pulp, the clinical history led to the conclusion that the pulpitis had ceased with the dying of the pulp, and further, that from the degenerated pulp tissue there came an infection of the periodontium.

On looking for an explanation of this rather peculiar condition, first of all the idea of a carious process had at once to be excluded in consideration of the locality and the shape of the channel and the condition of its inner sides. Nor do we know of any pathological process which could bring about the formation of a channel in such a manner, viz., by piercing the healthy dental tissue. If therefore, an acquired state is to be excluded, we can have before us only an abnormal formation originating during the stage of development. Now, formations of channels in the dentin of human teeth have occasionally been observed through which blood-vessels were running. Such appearances find their explanation by examination from the comparative anatomical standpoint, as the last indication of a vascularization of dentin which is a common occurrence among many fishes.

There can be no doubt that in the present case we have to deal with a similar vascular canal, which, however, in this instance gains a special peculiarity by its complete communication between pulp and periodontium. For even in animals, in which a more or less abundant vascularization of the dentin represents the normal state,

the blood-vessels do not as a rule reach the external surface of the tooth but terminate at a certain distance from the same.

Thus the preceding case goes hand in hand with that observed by Thiel, as well as with the above-quoted cases of Lepkowski of teeth in the stage of development, in the sense that also in this instance we have a channel in which *junctions of vessels* between the pulp vessels and the periodontal blood-vessels had taken their course. That the channel of the extracted tooth was found to be empty is not astonishing, if we remember that we have to deal with a tooth the pulp of which had died. The uneven slight depression in the immediate surrounding of the external orifice of the channel is to be explained by absorption processes following the pulpitis.

How such rare anomalies can also have serious consequences was shown in Thiel's case by the copious hemorrhage after the extraction of the tooth, and in our case it became fatal for the tooth, as the abnormal vascular channel had become the inlet-passage of the infection, which finally led to the loss of the tooth. For it is this place that we have to look to as a starting point of the pulpitis. The striking concordance between the patient's statements about the primal localization and the pathological anatomical discovery, as well as the appearances of absorption in this place do not admit of the slightest doubt on the subject.—*Jour. Brit. Dent. Assn.*

CAVITY STERILIZATION. By Earle C. Rice, D.D.S., Philadelphia. A microscopic examination of a longitudinal section of a tooth discloses fine tubular processes known as "dentinal tubules," extending through the dentin radially from the pulp. Contained within these tubules are protoplasmic processes (Tomes' fibers) which are continuations of the odontoblastic layer of the pulp. The tubules and fibers alike have their greatest diameters nearest the pulp, and decrease in size gradually toward the periphery of the dentin. This point is of clinical importance, as in deep carious cavities dental pulps are not infrequently infected by the products of bacteria and even invaded by bacteria themselves passing through the widened mouths of the tubules. Tomes' fibers are not nerve filaments, at least in the light of present knowledge they are not claimed to be such, although they are the media through which sensation is carried to the pulp.

Dr. Miller, after having conducted a series of experiments,

decided that dental caries was due to the result of lactic fermentation, the lactic acid thus formed having a decalcifying action upon the dental tissues. Bacteria next attack the decalcified parts and exert their destructive influence upon the organic structure of the teeth. Let it be well understood that decalcification must precede bacterial invasion, as bacteria are never found to invade the dental tissue beyond the depth of decalcification. As stated before, bacteria and their products may invade the pulp through the widened mouth of the tubules when decalcification has approached the pulp so closely that but a thin layer of normal dentin is left as a septum.

In the event of bacteria gaining access to the pulp inflammatory action is sure to follow. Leucocytes attack the germs and inflammatory effusions are poured into the intercellular spaces. The pulp, having no lymphatic system, cannot relieve itself of the effusions, and degeneration of necessity takes place within the pulp chamber. The pulp in this condition is said to be crippled, and sooner or later must go the voyage to meet the dear ones that have gone before. With these untoward effects of the presence of bacteria and their products in cavities of decay ever occurring, it behooves us to take steps to destroy those authors of sleepless nights and protect the dental pulp from their influence.

Wherever possible the tooth to be treated should be isolated with rubber dam; this is a cardinal point in the treatment of all cavities of dental decay. This done, all surfaces of the tooth should be thoroughly cleansed mechanically, and then bathed in alcohol (as near absolute as possible). Alcohol, having so great an affinity for water, absorbs minute quantities of moisture when exposed to the atmosphere. The cavity of decay should now be drenched with this same fluid and excavation begun. If it be found that the cavity is superficial in character, and that all decalcified dentin can be successfully removed, the possibilities of bacterial infection are not to be feared, and the tooth may be again washed with alcohol, thoroughly dried and filled. On the other hand, if the decalcifying process has extended so far toward the pulp that its removal would endanger that organ, an entirely different problem confronts the operator. He must now determine whether or not the pulp has been infected. If his diagnosis reveals a normal organ he may proceed in the following manner to prepare and sterilize the cavity:

Enamel margins are first prepared in the usual way until free

access to the cavity has been obtained. With spoon-shaped excavators the softer portion of carious dentin is now removed and the tooth drenched with alcohol. A current of warm air should be directed into the cavity until the remaining dentin has been well dried out. With keen-edged excavators the pulp is carefully approached until that portion of the dentin which is actually carious has been removed. A line of differentiation must be drawn between true caries and simply decalcified dentin. This is difficult, even impossible, without the aid of a microscope. We must therefore depend upon the general appearance of the dentin, and its resistance to the cutting power of the excavators. Having removed as much of the dentin as his better judgment dictates, it remains for the operator to thoroughly sterilize that portion of decalcified dentin overlying the pulp. The use of alcohol from time to time during the operation has occasioned desiccation of the dentin, and the antiseptic to be used will be drawn by capillary attraction into the dentinal tubules.

The Ceylon oil of cinnamon is no doubt the best antiseptic under the circumstances, as its lasting qualities are very great. It has, however, some unpleasant features which the writer will endeavor to eliminate in the following: A pledget of cotton fully as large as the cavity, saturated with Ceylon oil of cinnamon, may be placed in the cavity and a current of very hot air projected upon it until the patient exhibits signs of discomfort. The hot air increases the fluidity of the oil, which will be readily absorbed by the dentinal tubules. The heat also increases the germicidal power of the oil. The pledget of cotton when removed from the tooth will disclose some discoloration of the dentin occasioned by the cinnamon. The cavity should be immediately bathed with eucalyptol (the active principle of eucalyptus). This should be dried out with pledgets of cotton and the bathing repeated several times until the discoloration has disappeared. A current of warm air is now employed to dry the cavity, and that portion of the dentin overlying the pulp is coated with amber varnish. When the volatile menstruum of the varnish has been driven off by a current of air, the floor of the cavity may be covered with a generous layer of cement (oxyphosphate of zinc preferred), and the balance of the cavity filled with temporary stopping, as a safeguard against the pressure of the insertion of a permanent filling over newly-mixed cement. If the

tooth gives satisfactory evidence of normality of the pulp it may in a week or ten days be permanently filled.

The question may be asked: "Does the layer of decalcified dentin over the pulp ever become recalcified?" It does not. It is simply a perfect pulp-capping of mummified tissue.

What becomes of the toxines produced by the bacteria associated with caries? They remain immersed in the oil in the dentinal tubules, or they are rendered volatile by the use of alcohol in the cavity and thus eliminated. Suffice it to say that in the experience of the writer they have on but rare occasions made themselves manifest in the pulp, and it is just possible that the pulp was invaded by them prior to the operation of cavity sterilization. In other words, infection occurs only when the diagnosis as to the normal state of the pulp is faulty. In all cases where pulp-disorder did follow it appeared within twenty-four hours after the operation.

One word more. Thoroughness of detail, good judgment, and the element of haste entirely eliminated, make this method a success, decrease the sale of arsenic and dentin-obtundents, and render the soul-harrowing failures of root-canal fillings less frequent.—*Summary.*

CHRONIC APHTHOUS STOMATITIS. By H. W. Bettmann, M. D., Cincinnati. This is a disease which is not described in the textbooks on diseases of the mouth. During the past two years three cases have come under my observation, and the histories in all three are practically the same. The essential disturbance in all is the constantly recurring appearance of aphthous ulcers on tongue, lips, cheeks and gums. The ulcers do not differ in any respect from the typical aphthous ulcer as ordinarily seen. They are very painful; vary in size from that of a pin-head to eight or ten times as large; have the grayish white base surrounded by a reddish margin, and tend to heal in from four to seven days. Scarcely has one crop healed, however, before a second crop makes its appearance, and this process may be repeated without intermission for months and years. All my patients have been adult males without a history of syphilis.

CASE I.—D. B., aged forty-six years, merchant, came to me for treatment in the summer of 1901. For five years he had suffered from the practically continuous presence of aphthous ulcers in the

mouth. He had tried various forms of treatment without marked benefit; only once during the five years did he enjoy immunity for more than a few weeks at a time. He was naturally of a nervous temperament and had smoked to excess. Abstinence from tobacco for a year availed nothing. He had been told that his trouble was due to excess of uric acid, and had been dieted and placed upon alkalies; all without benefit. Treatment at various saline springs had done no good. My examination revealed no striking abnormality. Physical examination was negative. The saliva was normal. The urine was normal. A very slight degree of anemia existed. Hb 80 per cent. The gastric juice was hyperacid, containing 0.22 per cent free HCl. Total acidity, 0.3 per cent. The slight hyperchlorhydria was the only clue to treatment. I placed him on a diet free from vegetable acids, forbade tobacco and all alcoholic beverages, and prescribed a mixture of magnesia and soda. He was instructed to wash his mouth twice daily with the following excellent mouth wash (formula of which was originated by Dr. Miller, of Berlin):

℞ Acidi benzoic } .....aa 3.0
Saccharin }
Ol. Cinnamon 1.0
Alcohol .....ad 100.0

M. S.—One part to ten of water. Mouth wash. Hold in the mouth at least one minute.

His stomach was washed out at first three times a week to prevent any local irritation, but as the gastric mobility was very good the lavage was gradually abandoned. This treatment proved beneficial from the beginning, and was continued for nearly six months. During the last three months of treatment the patient was entirely relieved of all trouble. Since December, 1901, to date (a period of ten months) his mouth has remained free from all disturbance.

CASE 2.—Mr. X., merchant, aged forty-two, came for treatment in 1890. Had been troubled with exceedingly painful eruptions of aphthous ulcers almost continuously for sixteen years. Smoked considerably. Did not use alcohol in any form. Was robust and considered himself in excellent health except for slight gastric disturbance. The tongue was frequently coated, and bloating and belching after meals were often annoying. Examination revealed no abnormality in the blood, urine, or in any of the organs. The

gastric juice was hyperacid, containing 0.08 per cent free HCl. There was slight gastric catarrh. The above-mentioned mouth wash was prescribed, lavage was recommended, and a proper diet was prescribed. Tobacco was forbidden. The patient refused to submit to lavage systematically, but used the mouth wash for a time without marked benefit. He then disappeared from observation. In August, 1902, he returned for treatment, the aphthæ having appeared without intermission since the time of his last visit. He still refused lavage. I placed him on a diet free from all acids, fruits and fried foods; ordered cholagogue and saline laxatives systematically; again ordered the benzoic mouth wash, and though the patient is still under treatment his improvement during the past month has been very marked and no ulcers have appeared during the past three weeks.

CASE 3.—Male, adult, the resident of a neighboring city. Gave a history of having suffered many years without intermission from crops of aphthæ. I advised him to follow a plan of treatment as outlined above, but he passed from observation after his second visit.

WEIGHT OF THE BRAIN.—Sir James Crichton Browne, lecturing the other day, gave it out with the weight of his opinion that the mass and weight of the brain were the most important criteria of intelligence. Although mind and matter had no relation to each other as cause and effect, they were in the brain in invariably a definite union with each other. The growth of the brain was indicative of mental activity, and the failure of mental faculties was a measure of the decay of the brain. Close attention or active exercise of the thoughts caused a rise in the temperature of the brain. The heaviest organ of the body, next to the liver, the brain of the average male European, weighed forty-nine ounces, and of the female four or five ounces less. There was necessarily a relation between brain bulk and body bulk, and hence it was found that the taller races were generally the most intellectual, which the lecturer sought to demonstrate by this table:

Nationality.	Ave. Stature.	Brain Wt.
Scotch	5 ft. 8¾ in.	50 oz.
English	5 ft. 7½ in.	49 oz.
German	5 ft. 6½ in.	48.3 oz.
French	5 ft. 6¼ in.	47.9 oz.
Hindu	5 ft. 1¾ in.	45 oz.
Aboriginal Australians	5 ft. ⅛ in.	42 oz.
Pushmen	4 ft. 2¾ in.	35 oz.

Although the size of the brain indicated mental power it was only one of the conditions.—*London Leader.*

The Dental Digest.

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At 2231 Prairie Avenue, Chicago,
Where All Communications Should be Addressed.

Editorial.

DENTAL SOCIETY REPORTS.

In Dr. Black's paper in this issue of the DIGEST he refers to a new feature which has made its appearance in the dental literature of the year, namely, criticism of society reports. He states that in the last transactions of the Illinois State Dental Society he noticed a number of typographical errors and a line in his own report was transposed. He remarks that such things are common to all society reports and closes with, "I throw this out as a reminder that we should take more care in reporting society proceedings." We fail to see what connection the reporting of the discussions has with the matter of mechanical typographical errors. Dr. William H. Trueman of Philadelphia and Dr. Frank W. Sage of Cincinnati have both written able papers on this matter of society reports during the past year. They all speak of the "reporter," but we are not familiar with any such individual. The list of officers elected by various state and local societies make no mention of "reporter" or "editor," and to our knowledge there are only three societies in the country to-day, and all of them local, which elect an editor.

The DIGEST publishes the proceedings of a number of the leading dental societies of this country, and as we presume the conditions are the same in all societies as in them, we will outline briefly the various steps from the time of meeting to the appearance of the bound transactions. The "minutes" of the meeting, which form the greater part of the "proceedings" proper, are almost invariably written up by the secretary of the society, and in good shape, so need not be discussed here. As we understand the matter, all the papers that have been written and all the criticisms that have been advanced are solely on the "discussions." A stenographer is engaged at the outset of each meeting to take down as accurately as may be the remarks made by the various men who discuss papers. The usual

fee for this work is about $100, which is as much as the society or the journal, as the case may be, thinks it can afford. This price, which includes furnishing duplicate typewritten copies of the discussions, is not large enough to secure an expert court stenographer, but for the most part the work is well done and the typewritten copy gives the discussor's exact language. The secretary mails a copy of each man's remarks to him with a request that they be revised and corrected if necessary and returned at once. One-third reply promptly, another third require three or four letters, and at least a third are too lazy or indifferent to give the matter any attention. When the secretary has secured as many revised remarks as possible he sends them to the editor of the journal which is to publish the proceedings, supplying the stenographer's original report in the case of the delinquents.

Most people have an idea that the secretary prepares these discussions for publication; others think it is done by the publication committee, or by the "reporter." Nothing of the sort takes place, however, as the discussions come to the editor exactly as they are turned over to the secretary. If any man is disposed to blame these officers for not preparing this matter for publication, and thinks that if he were in any one of those positions he would do his duty, we should like to hear from him, as we can give him enough work to occupy all his time for some years to come. It is a simple thing to say that the work should be done by someone in the society, but unless one has tried to get into presentable shape the discussions of the average dental society he has no conception of the work involved. The average dentist, no matter how well educated, is not qualified for the work unless he has had special experience along this line, and if a man were capable he would hardly be willing to spend the time necessary for the work without compensation, and this the societies are not disposed nor able to give.

It therefore all comes back on the journal editor. In some cases he publishes the matter practically as turned over to him by the secretary, correcting mistakes in spelling and flagrant grammatical errors, but making no effort to condense, round out, or otherwise better the discussions. This is easy for the editor but very bad for the society, and the circulation of such journals is usually small, as few readers will put up with that sort of thing for any length of time. The majority of editors, however, revise all papers and dis-

cussions, thereby shortening their days and adding to the number of their enemies. The average dentist who discusses a paper wants his remarks to be printed exactly as he made them, or at least exactly according to the revised copy which he furnishes. If the editor should do this the dentist would mob him, for his friends would show him in how many different ways he had made himself ridiculous if he were unable to realize it for himself when he saw his remarks in print. The larger dental journals have several thousand subscribers, and they cannot afford to bore them for the sake of humoring any one man or any body of men, nor should they be asked to do so. Consequently, the editor fixes up the discussion, leaving out the personalities and irrelevancies and bringing forward the points which bear on the subject of the paper, and from his greater experience he probably does the work better than the man himself could. The man, however, is rarely grateful, either feeling piqued because he has not been given a chance to spread himself, or swearing that he never said anything of the sort. In most cases he didn't —he said it as much worse as possible. This is frequently not the man's fault. The whole plan is wrong. Essayists are selected to read papers on certain subjects and men are chosen to discuss those papers with no thought in either case of the men's knowledge or ability along that special line.

We spoke of this matter editorially in our March issue, but as the same conditions obtain now as then, we will briefly repeat. A man should not be asked to read a paper before a society unless he has special knowledge of the subject or is willing to do some original work in the year before the meeting so that he can offer his fellow members something worth while. In the second place, the men who are selected to discuss papers should be chosen with the same idea in mind, and no man should be allowed to read a paper unless he has sent copies of it some days or weeks beforehand to the men who are to discuss it. At least half of all dental papers and discussions start with an apology. Think what that means. Yet in spite of this wonder is often expressed that more men in the state do not attend the society meetings. Let us strike at the roots of this tree of discord instead of lopping off a few branches, in other words, let us improve the papers and discussions of the societies instead of criticising the published proceedings.

Notices.

NORTHERN ILLINOIS DENTAL SOCIETY.

The sixteenth annual meeting of the Northern Illinois Dental Society will be held at Freeport, Oct. 21-22, 1903. Meet with us and enjoy the good program of papers and clinics that has been prepared.

A. M. HARRISON, Secy., Rockford.

MASSACHUSETTS STATE BOARD OF DENTAL EXAMINERS.

The Massachusetts Board of Registration in Dentistry will hold a meeting for examination of candidates in Boston, Oct. 28-30, 1903. Information and application blanks can be obtained from the secretary.

G. E. MITCHELL, Secy., 25 Merrimack St., Haverhill.

SOUTHERN ILLINOIS DENTAL SOCIETY.

The eleventh annual meeting of the Southern Illinois Dental Society will be held at East St. Louis, Oct. 13-14, 1903. An interesting program is assured, and all members of the profession are cordially invited to be present.

HARRY K. BARNETT, Secy., Upper Alton.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will be held at Buffalo, Dec. 28-30, 1903. An exceedingly interesting program is being arranged, details of which will be published in the next issue of this journal.

W. H. WHITSLAR, Chairman Ex. Board, Cleveland.

OHIO STATE BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners of the State of Ohio will meet in Columbus, November 24-26, 1903, at Hotel Hartman, for examination of candidates for certificates of registration. Applications should be filed with the secretary by Nov. 14.

H. C. BROWN, Secy., 185 E. State St., Columbus.

MARYLAND STATE BOARD OF DENTAL EXAMINERS.

The Maryland State Board of Dental Examiners will meet for the examination of candidates for certificates at 9 a. m., Nov. 4-5, 1903, at the Baltimore College of Dental Surgery, Baltimore. For application blanks and full particulars address the Secretary.

F. F. DREW, Secy., 701 N. Howard St., Baltimore.

DENTAL COMMISSIONERS OF CONNECTICUT.

The Dental Commissioners of the State of Connecticut will meet at Hartford, Nov. 18-20, 1903, to examine applicants for license to practice dentistry and for the transaction of any other proper business. The practical exami-

nation in operative and prosthetic dentistry will be held at 9 a. m., Nov. 18, in Putnam Phalanx Armory, Haynes and Pearl Sts. The written theoretic examination will be held Nov. 19 and 20 at the Capitol. All applicants should apply to the recorder for proper blanks and for the revised rules of conducting the examination. Application blanks must be carefully filled in and sworn to, and with fee of $25 be filed with the recorder on or before Nov. 10.

J. TENNEY BARKER, Recorder, Wallingford.

NORTHEASTERN DENTAL ASSOCIATION.

The ninth annual meeting of the Northeastern Dental Association will be held in the new Horticultural Hall, Massachusetts and Huntington Aves., Boston, Oct. 21-23, 1903. An interesting and profitable meeting with a full line of exhibits is promised. Boston is an ideal place for a large meeting. Please come and help make it so.

EDGAR O. KINSMAN, Secy., Cambridge, Mass.

MINNESOTA STATE DENTAL ASSOCIATION.

At the annual meeting of the Minnesota State Dental Association, held at Minneapolis, Sept. 1-3, 1903, the following officers were elected: Pres., J. M. Walls, St. Paul; V.-P., H. C. Child, Minneapolis; Secy., Geo. S. Todd, Lake City; Treas., H. M. Reid, Minneapolis; Chairman Ex. Com., J. O. Wells, Minneapolis; Master of Clinics, J. F. McCrea; Mem. Board of Regents, C. A. VanDuzee, St. Paul. The next meeting will be held in St. Paul.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

It is earnestly requested that all the secretaries of the Boards of Examiners throughout the states and territories mail to the secretary all changes in their respective boards.

On account of the resignation of B. L. Thorpe as president of this Association, J. G. Reid, Trude Bldg., Chicago, will assume the duties of the president.

CHAS. A. MEEKER, Secy., 29 Fulton St., Newark, N. J.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

The next regular semi-annual meeting of the South Dakota State Board of Dental Examiners to examine applicants for licenses to practice in the state will be held at Vermilion, Dec. 8-11, 1903. No candidates will be received for examination after the 8th. Only those who hold diplomas from reputable dental colleges and those having had three years of actual practice in dentistry immediately preceding the examination are eligible to take the same. Candidates must come prepared to make all kinds of fillings and must bring with them teeth and the necessary tools for doing both bridge and vulcanite work. The examination fee is $10 and a subsequent $5 will be required if applicant is successful in passing examination.

G. W. COLLINS, Vermilion, Secy.

RESOLUTIONS BY FRATERNAL DENTAL SOCIETY OF ST. LOUIS.

At a meeting of the Fraternal Dental Society of St. Louis, Sept 8, 1903, the following resolutions were unanimously adopted:

Whereas, the Fourth International Dental Congress which is to meet in St. Louis, Aug. 29-Sept. 3, 1904, under the auspices of the Louisiana Purchase Exposition, is to be the greatest event in the history of dentistry, and

Whereas, the Fraternal Dental Society of St. Louis is progressive and stands for the best in dentistry and its interests, therefore be it

Resolved, that the Fraternal Dental Society of St. Louis heartily endorse the Fourth International Dental Congress and tender it our aid and support as a society and as individuals.

W. L. WHIPPLE, Pres. pro tem.
E. E. HAVERSTICK, Secy.

UNION MEETING OF SEVENTH AND EIGHTH DISTRICT SOCIETIES.

The thirty-fifth annual union meeting of the Seventh and Eighth District Dental Societies of the State of New York will be held at the Osburn House, Rochester, Oct. 27-29, 1903. A most excellent meeting with numerous clinics is promised. One day will be devoted exclusively to clinics, with discussions of same in evening. Application has been made for reduced railroad rates. Exhibitors desiring space are requested to communicate with the hotel or the Business Committee. A partial program follows:

Papers.

I. L. M. Waugh, Buffalo. Histology of dentin, illustrated with lantern slides.

C. W. Stainton, Buffalo. Subject to be announced.

Harry L. Belcher, Buffalo. Subject to be announced.

J. W. Beach, Buffalo. New remedies.

Robert Brewster, Chicago. The avoidance of opacity in porcelain inlays and the use of oil colors in porcelain work.

A. Osgood, Bath, N. Y. The vacuum chamber.

L. S. Goble, Rochester. Practical sterilization for the dentist.

Clinics.

Robert Brewster, Chicago. (A) Building porcelain inlay entirely of one body. (B) Building porcelain inlay using different layers and colors. (C) Demonstrate the use of oil colors in porcelain work. (D) Demonstrate the swaging method of making matrices.

A. S. Barnes, Oneonta, N. Y. Partial dentures.

C. H. Land, Detroit. (A) Porcelain veneers for cement and gutta-percha fillings. (B) Porcelain veneered incisors, and an entire artificial enameling over defective teeth that is thoroughly practical and durable without the necessity of pulp destruction.

H. H. Tompkins, Utica, N. Y. A new engine bur for inlay work.

I. C. Edington, Rochester. The use of vulcanizable gutta-percha in plate work.

F. M. Rood, Rochester. The use of a screw to support pulpless teeth.

G. B. Mitchell, Rochester. Preparation of cavity and matrix for porcelain inlays.

C. W. LaSalle, Rochester. Aluminum lining for rubber plate.

A. E. Sager, Rochester. Dr. D. D. Smith's method in oral prophylaxis.

C. C. Bachman, Waterloo, N. Y. Putting new porcelain facings on bridge-work in the mouth.

C. W. Cochran, Erie, Pa. Porcelain jacket or enamel crown.

R. W. McDonald, Erie, Pa. Porcelain dowel crown, using Brewster's body.

C. C. Sanbach, Scranton, Pa. (A) Porcelain work, using Jenkins' furnace. (B) Demonstrating use of DeTrey's gold.

H. W. Arthur, Pittsburg. Readily-made matrices and their application.

C. H. Reynolds, Strathroy, Canada. Microscopical specimens from the mouth.

G. Evans, New York. Method of forming close-fitting crown. Posts and cementation of crowns and bridges with gutta-percha cement.

L. W. Ballard, Alliance. Country dentists' make-shifts.

W. E. Jackson, New Castle, Pa. Porcelain-faced gold caps for bicuspids and molars.

A. McAlpin, Bradford, Pa. Anchor screws and a new chuck for inserting them.

H. C. Webb, Syracuse. Simple method of regulating with a rubber appliance.

J. B. Snyder, Bryan, Ohio. Partial restoration of incisors, using electric mallet and gold and platinum folds.

C. F. Bunbury, Rochester. Partial lower dentures.

E. B. Spalding, Detroit. An all-porcelain jacket crown, or the natural enamel replaced by porcelain.

The subjects of the following to be announced: J. L. R. Heichhold, Clearfield, Pa.; A. R. VanVleck, Hudson, N. Y.; L. C. Jones, Wolcott, N. Y.

A complete program will be issued on October 13.

W. W. Smith, Chairman Business Committee, No. 63 East Ave., Rochester, N. Y.

News Summary.

S. S. Robie, 66 years old, a dentist at Boston, died Sept. 12, 1903.

G. W. Pierce, 36 years old, a dentist at Somerville, Ala., died Sept. 19, 1903.

Henry Garrett, 79 years old, a dentist at Wilmington, Del., died Aug. 25, 1903.

Joseph Dimmick, a dentist at Oakland, Cal., went violently insane Sept. 16, 1903.

CHARLES HOUGHTON, 65 years old, a dentist at Batavia, N. Y., died Sept. 17, 1903.

I. T. STRAYER, 60 years old, a retired dentist at Spokane, Wash., died Sept. 2, 1903.

L. H. LAWTON, 64 years old, a dentist at St. Paul, died Aug. 26, 1903, after a long illness.

C. W. HAMILTON, a dentist at Ithaca, Mich., dropped dead Aug. 29, 1903, from apoplexy.

H. E. EDMONSTON, 25 years old, a dentist in Brooklyn, died Sept. 8, 1903, from diphtheria.

A. N. COPSEY, 46 years old, a dentist at Ukiah, Cal., died Aug. 15, 1903, from consumption.

C. H. MARSHALL, 36 years old, formerly in practice in Chicago, committed suicide in Toledo, O., Sept. 23, 1903.

J. F. MARRINER, 73 years old, and for many years in the practice of dentistry in Chicago, died September 13, 1903, from heart failure.

DENTIST WINS PRIZE.—Dr. J. M. Austin, St. Joseph, Mo., was awarded first prize—a trip to the St. Louis Fair in 1904—in a contest for beautifying the lawns of the city.

GLASS-CAPPED MEDICINE BOTTLES.—(A. E. Mimmack, *Forum.*)—To insure easy removal of glass caps from medicine bottles, smear the ground surface of the neck with vaselin.

TO REMOVE ADHERING PLASTER FROM VULCANITE PLATES.—Place the plate for a short time in water containing a small quantity of sulphate of potassium.—DR. ISHAM, *Forum.*

SENSITIVENESS AT NECKS OF TEETH.—Apply a saturated solution of carbonate of potassium in glycerin. This is very effective and does not discolor like nitrate of silver.—*Review.*

TOO GREAT A STRAIN.—"What shattered his faith in human nature?" "He bought an unbreakable comb, took a dose of tasteless cod liver oil, and visited a painless dentist."—*Smart Set.*

DENTAL SCHOOLS MERGE.—It is stated on good authority that the Chicago College of Dental Surgery has become affiliated with the University of Illinois, which will merge the two dental schools.

DIVORCES.—B. Brandeis, a dentist of New York City, has been sued for divorce by his wife, who alleges desertion and cruelty.—A. C. Valadier, a dentist of New York City, has been sued for divorce by his wife.

NEW NAME FOR CHRISTIAN SCIENCE.—A Christian Science reader or healer "passed on" from Toledo recently, and the unfeeling "claim" made in the certificate was that death was due to autointoxication.—*Med. Record.*

NORTHERN INDIANA DENTAL SOCIETY held its annual meeting at Wabash, Sept. 15-16, 1903, and elected the following officers: Pres., S. B. Hartman, Fort Wayne; V.-P., J. A. Stoeckley, South Bend; Secy. and Treas., Otto U. King, Huntington; Supervisor of Clinics, L. A. Salisbury, Crown Point.

To serve with the above officers as members of the executive committee—A. H. Wagner, Huntington; M. Wilson, Rochester; C. E. Redmon, Peru; J. W. Stage, Goshen; M. W. Strauss, Huntington.

FIRES.—F. B. Allen, Okeene, Ok. Terr., Aug. 29; total loss.—J. H. Blood, Leroy, N. Y., Aug. 24; slight loss.—E. B. Hunt, Mt. Victory, O., Aug. 27; loss $600, no insurance.—P. T. Richards, Glasgow, Ky., Sept. 5, loss $200.

OBTUNDING SENSITIVE DENTIN; A SUGGESTION.—(N. C. Leonard, *Headlight.*)—Chlorid of sodium being used in the animal economy to promote endosmosis, why would it not in solution with cocain aid in conducting the latter through the dentin?

RECEDING GUMS.—The application of glycerite of tannin to spongy and receding gums will be found effective. Whether this condition be due to ptyalism or debility following acute diseases, the topical use of this simple remedy will be satisfactory.—*Med. Standard.*

OXYPHOSPHATE FOR INLAY IMPRESSIONS.—Dust the cavity with pulverized soapstone and insert a pellet of quick-setting oxyphosphate, letting it extend over the edges of the cavity. When set remove, dust the surface with soapstone, and make a mold of the same material.—*Cosmos.*

NEW YORKERS EASY.—A woman in New York has entered the get-rich-quick field, and she offers 1,900% profit in "just a little while." She is confining her operations mostly to dentists and physicians, and it is stated is meeting with fair success. Yet they call us westerners hayseeds.

FIRST DISTRICT (ILL.) DENTAL SOCIETY met at Macomb, Sept. 15-16, 1903, and elected the following officers: Pres., H. W. McMillan, Roseville; V.-P., W. W. Morehead, Aledo; Secy., J. W. Marsh, Warsaw; Treas., J. D. McMillan, Macomb; Ex. Com., H. F. Nauman, Quincy.

INVESTMENT FOR INLAY WORK.—(F. T. Van Woert, *Summary.*)—A bottle of powdered asbestos and water, of creamy consistency, can be kept in the cabinet, near the chair, ready for use at any moment, and will be found much cleaner and neater to handle than mixing for each case.

NORTHERN IOWA DENTAL SOCIETY held its annual meeting at Clear Lake, Sept. 1-3, 1903, and elected the following officers: Pres., Wm. Finn, Cedar Rapids; V.-P., A. W. Beach, Sheldon; Secy., C. L. Topliff, Decorah; Treas., H. W. Riser, Lansing. The next meeting will be held at Waterloo.

PORCELAIN INLAYS.—If an inlay is embedded face down in base-wax and the exposed portion covered with hydrofluoric acid for five or ten minutes, the etched surface will add greatly to the strength of the setting because of the strong adhesion of cement to such a surface.—F. T. VAN WOERT, *Brief.*

THE RELIABLE PRESS.—"Last night a woman forty years was brought back to life by the injection into her arm of a half pint of salt solution. The patient was taken to a local hospital for an operation, after which the physicians discovered that her heart had ceased to beat and five doctors pronounced her dead. As a last resort a vein in the right arm was opened and a salt solution injected. In three seconds the patient arose on the operating table and asked for something to eat."—*Chicago Record-Herald.*

Icelandic Caninopathy.—"A patient at the hospital died yesterday, and his physician finally reached the conclusion that the patient's disease was echinococcus, peculiar to Iceland, and superinduced by association with dogs."—*Salt Lake City Tribune.*

FATALITIES.—Last month a man at Valparaiso, Ind., died from blood-poisoning caused by an abscess at the root of a tooth.—Aug. 31 a woman in Chicago died in a dentist's office while under an anesthetic given for the extraction of some teeth. The dentist was exonerated by a coroner's jury, as a physician administered the anesthetic and it was proven that the woman had a weak heart.

HOW NOT TO BE NERVOUS.—"If you wish never to be nervous, live with reason, have a purpose in life and work for it; play joyously; strive for the unattainable, never regret the unalterable; be not annoyed by trifles; aim to attain neither great knowledge nor great riches, but unlimited common sense; be not self-centered, but love the good, and thy neighbor as thyself."—*Hugh T. Patrick, M. D.*

CHICAGO MOST HEALTHFUL CITY.—For the seventh successive year, Chicago's death rate is lower than that of any other city of first magnitude. The death rate per 1,000 inhabitants of New York City (Manhattan and Bronx) was 19.18; of Boston, 18.58; Greater New York, 18.28; Philadelphia, 17.85; Chicago, 14.49. Chicago's infant and child mortality is the lowest of any city of its size.

LIFE INSURANCE AND THE TEETH.—For life insurance companies the question of the condition of the teeth is of such great importance that in the near future they will require examination of the teeth by an expert dentist, which examination, in connection with the general examination, will constitute a factor which in certain circumstances will be the only means of recognition.—EUDORE DUBEAU, *Dominion Journal.*

PRACTICE NOT TRANSFERABLE IN GERMANY.—A physician sold his practice to another and sued for the $475 agreed on, which the buyer had failed to pay. The courts at Braunschweig, where the transaction occurred, dismissed the case, claiming that a medical practice is not a marketable commodity, and that a transaction involving its sale is unworthy of the profession and contrary to the best interests of the community.—*Jour. A. M. A.*

CHILDREN'S TEETH TO BE CARED FOR.—According to newspaper reports the municipality of Strasburg, Germany, has voted to build an $80,000 dental hospital for school children. Each pupil must submit to a dental examination on entering and twice during each school year until the age of thirteen. The burghers have come to the conclusion that a large proportion of the ills children suffer from are due to bad teeth and lack of proper dental attention.

DAMAGE SUITS.—A man in Bradford, Pa., has sued a dentist in that town for $10,000 damages, claiming that the latter broke his jaw while extracting a tooth.—A woman in Chicago has sued a dentist for $10,000 damages for poor work.—A woman in Omaha has brought suit against a notorious dental parlor to recover money which she paid the proprietor. She alleges that her teeth are ruined.—Another woman in Chicago has sued a

dentist in this city for $10,000 damages, alleging that he permanently injured her mouth.—A man at Des Moines, Ia., has sued a dentist in that city for $5,000 damages. He alleges that in May, 1902, his wife was given ether by the dentist for the extraction of some teeth, and immediately afterwards died from tuberculosis.

CLEANING GLASS CEMENT SLABS.—(George Zederbaum, *Review.*)—Every practitioner knows how difficult it is to remove the cement which adheres to a glass cement slab. Usually a knife is resorted to and the slab presents a scratched appearance therefrom. I accidentally discovered that dilute nitric acid will remove all cement particles no matter how hard, and the slab, after being rinsed in water and dried, will have a clean. smooth surface.

ILLEGAL PRACTITIONERS.—A man at Springfield, Ill., was recently arrested for practicing dentistry without a license.—The proprietor of a "painless dental college" of Omaha has been fined $35 and costs for practicing dentistry without a certificate.—Two employes of a dental parlor at Washington, Pa., were recently arrested for practising dentistry without a license. One was released and the other bound over for trial at the November term of court.

WHAT THE BRAIN WILL STAND.—A French investigator has come to the conclusion that the brains of naval and military men give out most quickly. He states that out of every 100,000 men of the army or naval professions 199 are hopeless lunatics. Of the so-called liberal professions, artists are the first to succumb to the brain strain, next the lawyers, followed at some distance by doctors, clergy, literary men and civil servants. Striking an average of this group, 177 go mad to each 100,000.

CARBOLIC ACID IN THE TREATMENT OF ALVEOLAR ABSCESS.—With a small amount of carbolic acid in the putrescent canal use a piece of soft rubber and apply pressure, filling the cavity with the rubber and forcing the carbolic acid up into and through the canal. To guard against the escharotic effect of the carbolic acid as it comes through the fistulous opening, first dry off the gum thoroughly and then paint glycerin over the surface, so that the glycerin may immediately take up the overflow of acid.—DR. AUSTIN, *Era.*

CLOUDING OF MOUTH-MIRRORS.—Dr. Paul F. Soudern describes (*New York Med. Jour.—Cosmos*) a method of preventing the clouding of laryngoscopes which can also be used in the case of dental mouth-mirrors. The method is thus described: "By means of the finger slightly moistened apply a film of soap of any brand or kind to the mirror; then rub this off with a clean, dry cloth; the mirror will be as bright and clear as ever; breathing on it will not affect its clearness. The method is certainly a clean one, and the mirrors do not suffer from the operation."

REPAIRING A RUBBER DENTURE.—(J. P. Buckley, Review.) When one or two teeth are broken they can be easily and quickly replaced in the following manner: Select teeth that will fit perfectly in their proper position on the plate. Cut a cavity, dovetailed in shape, in the rubber back of the pins, being careful not to cut through the plate. Fuse Melotte's alloy and drop small pieces on an asbestos pad. Hold the plate firmly with the left hand, the

index finger pressing against the tooth or teeth to be secured. Place the small pieces of alloy in the cavity and with a hot wax spatula they can be partially fused and pressed around pins of teeth and into the cavity. This method is quicker and better than amalgam for the same purpose, and I have used it several times with much satisfaction where the patient was unable to leave the plate long enough to repair by vulcanizing.

NAYTHER WAN.—"How did the doctor tell you to take the medicine, Larry—internally or externally?"

"Nayther wan, sor.'

"But it must have been one or the other."

"Divil a bit, sor. Nayther wan."

"But look here, Larry; that's absurd. It must have been one or the other, you know."

"Nayther wan, I tell ye. He toll me to shnuff it up me nose."

EXAMINING BOARD AFFAIRS.—Sept. 3 the governor of Michigan appointed Dr. W. C. McKinney of Saginaw a member of the State Dental Examining Board to succeed Dr. E. W. Loeffler, who recently resigned.—Sept. 19 the governor of Missouri appointed E. B. Dameron of St. Louis a member of the State Board of Dental Examiners to succeed B. L. Thorpe, who recently resigned.—The governor of Pennsylvania has reappointed Dr. H. Depuy of Pittsburg on the State Dental Examining Board. He is serving his third term. The governor also appointed Dr. H. B. McFadden of Philadelphia to succeed Dr. H. E. Roberts.

ROBBERIES.—Charles Dundas, Los Angeles, Cal., Sept. 1, $57.—Willett & Stephens, Pekin, Ill., Aug. 29, $25.—D. Baldwin, Peoria, Ill., Sept. 4, $50.—W. C. Thomas, Alexandria, Ind., Sept. 8, $200.—D. G. Mahood, Webster City, Ia., Sept. 15, $125.—R. P. Dakin, Attleboro, Mass., Aug. 26, $25.—C. H. Webb, Attleboro, Mass., Aug. 26, $20.—E. N. Clarke, Taunton, Mass., Sept. 1, $60.—A. E. Threfoy, Niles, Mich., Aug. 21, $70.—E. Kuper, Maplewood, Mo., Aug. 30, $75.—P. Helmuth, St. Louis, discovered a thief in his office Sept. 2 when he returned from luncheon. The burglar rushed downstairs, but the doctor took the elevator and caught him on the ground floor.—F. A. Upham, Nashua, N. H., Aug. 20, $40.—W. T. Reynolds, Amsterdam, N. Y., Sept. 6, $100.—Quinlan Dental Co., Amsterdam, N. Y., Sept. 6, $45.—A. D. Young, Amsterdam, N. Y., Sept. 12, $50.—R. E. Duignan, Gloversville, N. Y., Sept. 7, $40.—R. D. Sayre, Gloversville, N. Y., Sept. 7, $90.—W. E. Lansing, Gloversville, N. Y., Sept. 7, $150.—A. B. Cowles, Rome, N. Y., Sept. 6, $150.—L. H. Jones, Rome, N. Y., Sept. 7, $50.—E. A. Smith, Rome, N. Y., Sept. 6, $80.—Cain & Hill, Canton, O., Aug. 25, $200.—Thomas Morgan, Sharon, Pa., Sept. 6, $15.—E. & M. H. Wightman, Pawtucket, R. I., Aug. 27, $500.

POLISHING PORCELAIN.—(Dr. C. F. Hartt, *Review.*)—We hear a great deal said about the necessity of fusing the surface of a porcelain inlay after it has been ground to shape in order to obtain the requisite glossy appearance, but this is wholly uncalled for. As perfect a polish may be given porcelain as can possibly be given gold or any of the metals. Grind the inlay or crown

to the proper form, then go over the surface with a sandpaper disk, to be followed by a cuttlefish disk. Then take some oxid of tin polishing putty and with wooden points known as Barker's porous polishers, as beautiful a surface may be given to porcelain as can be imparted to it by the furnace. By this method inlays may be ground at will, with the perfect assurance that a satisfactory finish may be given without fusing again.

CLEANING OF TEETH IN SLEEPING CARS.—There are evils of construction in the modern railroad car responsible for much of the infection and the difficulty of eradicating it. With the spitting, hawking, and blowing of the nose into the wash bowl (everybody washes their teeth over these bowls, for no other place is provided), it is no wonder that they frequently convey infection. It is unfortunate that a special sink is not furnished in the toilet-room of the coach for the teeth-cleaning process, and that the faucets of the wash bowl are not arranged so that one can wash in running water.—*International Journal of Surgery.*

MELANATIC CANCER OF THE FACE.—Jaboulay (*La Semaine Medicale*) emphasizes the importance of non-interference with moles. The presence of a mole from its contained pigment should always warn a physician of the danger of melanosis. In his paper he mentions two cases in which a mole after being picked and squeezed developed into a malignant growth. One of these patients, a medical student, excised a mole of the hand and died a short time afterward from melanosis. The malignant neoplasm which developed at the site of the mole in his second patient was situated in the region of the right temple and was regarded as inoperable from its extent. He has administered quinine lactate with some temporary benefit.

ULTIMATE RESULTS OF SURGICAL OPERATION UPON THE FRONTAL SINUS AND MAXILLARY ANTRUM.—Lermoyez (*British Med. Jour.*) treats acute frontal sinusitis by inhalation of mentholized steam; if this fails the sinus may be syringed by catheterizing its natural orifice. Removal of the head of the middle turbinated bone and curetting of the polypi facilitates drainage. When these methods have failed, the anterior wall of the sinus should be excised, the cavity curetted and drainage through the nose established. The resulting disfigurement may be remedied by the injection of paraffin. Diplopia, due to interference with the superior oblique muscle, may be rectified by stretching the inferior rectus muscles of the affected side. The best operation for maxillary sinusitis consists in making a temporary orifice through the cuspid fossa for curetting and disinfection, and a permanent opening into the nose for drainage.

ANEMIC ANESTHESIA.—Dr. Steiner (*Med. News*) observed in Java a method employed to induce sleep. It consists in compressing the carotid arteries. The operator sits on the ground beside the patient, whose neck he seizes with both hands. The index and middle fingers are then pushed forward into the carotids, which are compressed toward the spine. The patient's respiration becomes more rapid and more profound and his head relaxes backward. The method is absolutely harmless, anesthesia is rapidly obtained, and the patient wakes promptly with no symptoms of nausea or

malaise. Dr. Steiner declares the method to be well known in Java, where it is used to relieve headache, sleeplessness, etc., and points out the fact that the carotid artery was known to the ancients as arteria soporifera, and that its name in modern Russian is "artery of sleep." He does not seem to know that the method is widely practiced in India. Kipling's Kim, for example, is put to sleep by a process of the sort. Dr. Steiner experimented upon thirty Javanese, and was successful in all but five cases. He sat in front of the patient, placing his right hand on the left, his left hand on the right side of the patient's neck. When the ends of his fingers met at the back of the neck he placed his thumbs back of and a little below the angles of the lower jaw. The beating of the carotid was felt, and then a moderate pressure toward the spine was applied. The loss of consciousness was complete and in one case an abscess was lanced without sensation on the patient's part.

WIFE LIABLE FOR MEDICAL ATTENDANCE ON HUSBAND.—The Supreme Court of Nebraska holds, in the case of Leake vs. Lucas, that when a husband is actually a part of the family, living with it as such, and is temporarily helpless and incapacitated by illness, his maintenance and support, including necessary medical attendance, come fairly within the rule of the statute of that state which makes the wife liable as surety for necessaries furnished the family. It further holds that, in such case, where the husband and family, including the wife, remove to a sister state, and no judgment can be obtained against him in Nebraska, the obtaining of a judgment against him in the courts where he resides, causing an execution to issue thereon, and having it returned unsatisfied, is a sufficient compliance with the provisions of the statute to sustain an action against the wife to recover for such medical attendance. In the commissioners' opinion it was stated that this was the first time that this question of the wife's liability had been before them; that they found but little authority upon it elsewhere, and that they did not intend to establish a rule of law by which they should be conclusively bound in such cases hereafter, for every decision on this question must necessarily be largely governed by the facts existing in the particular case in which it is rendered, but that it would seem that the medical attendance necessary to cure the husband of the wife sued of his illness, and thus place him in a position to labor and support the family, herself included, was a necessary furnished for its benefit.—*Jour. A. M. A.*

CYSTS IN THE JAWS.—Lindt (*Cor. Blatt f. Sch. Aertze*) observes that the differentiation of the cysts in his five cases was difficult. Two sailed under the flag of a fetid nasal suppuration and three under that of an abscess at the root of a tooth. In the latter the cysts caused no symptoms until infected through a carious tooth or after extraction of one. Chronic fistulæ in the cuspid fossa, hard palate, or in the lower jaw below the alveole, with simultaneous or preceding protrusion of the bone, speak in favor of a cyst, especially when the probe penetrates into a cavity. The diagnosis is confirmed by the finding of epithelium, fat, detritus or cholestearin crystals in a serous or serosanguinolent or cheesy purulent secretion. Pure empyema of the antrum does not cause the bone to protrude, and very seldom entails

a fistula; fluids also pass into the nose when injected into the antrum, which does not occur in case of a cyst. The most effective treatment is to cut out as large a piece of the front wall of the cyst as possible without interfering with the epithelial lining, and then try to unite the latter with the epithelium lining of the mouth. This transforms the cyst into a mere recess in the buccal cavity, which after a time flattens out and becomes practically obliterated. This applies only to small, non-infected cysts. In case of old infection the only treatment is extensive resection of all the inflamed tissue after resection of the entire front wall of the cyst. The cavity must be completely deprived of its epithelial lining and broad communication established between it and the mouth or nose. The cavity fills with healthy granulations and sooner or later heals completely. One of the cases related illustrates the difficulty of complete removal of all the epithelial lining, and it also shows the extensive proliferation, inflammation and pains that may follow in case even a minute scrap of it is unintentionally left behind.

Relationship of Hereditary Syphilis to Imperfect Dentition.—Dr. Franz Poor (*Ungarische Stomatologische Zeitschrift—Cosmos.*)—The author discusses in detail Hutchinson's tooth and differentiates it from others which present close resemblance thereto. He makes reference to the three diagnostic signs of hereditary syphilis: (1) Parenchymatous keratitis; (2) the characteristic abnormality of the two upper incisors; (3) disturbances of the labyrinth. He then states that Robinson, Hyde, Krisowski and himself have observed a pathognomonic sign of hereditary syphilis. This sign consists in the presence of two white linear radiating scars in the mouth, eyes or anus, and are in evidence in company with one or more of the three Hutchinson signs already referred to. Dr. Poor very wisely remarks that authors erroneously speak of as "Hutchinson's teeth" organs with deformities which in no way resemble the abnormalities described by the English observer, and notwithstanding that in 1863 Dr. Hutchinson stated that the whole question involved the examination of the permanent upper lateral incisors, and that many physicians who are not acquainted with tooth deformities could spare themselves many inconveniences by limiting their examinations to these teeth: "The teeth of hereditary syphilis are generally short and narrow with a marked furrow upon the incisal edge and round corners. Horizontal notches and furrows are frequently seen, although these deformities have no relationship with syphilis." The essayist states that these teeth when fully developed are pathognomonic of hereditary syphilis. Later on Hutchinson made the statement which follows: "If the central incisors are arrested in their development and a single fissure is present upon the free border, the diagnosis of syphilis is almost certain. As far as the lower incisors are concerned, they seldom present the fringed border or small appearance, but even if they do these signs are of no value if the characteristic signs of the upper lateral incisors be not present."

Marriages.—R. P. Culver, a dentist at DeKalb, Ill., married Miss Olga Collin of DeKalb, Aug. 20.—S. A. Carroll, a dentist at New Haven, Conn., married Mrs. Bertha A. Brow of New Haven, Aug. 25.—M. H. Dailey, a dentist of Akron, N. Y., married Miss Ella N. Persons of Akron, Sept. 5.—

L. F. Friedmann, a dentist of Tell City, Ind., married Miss Helen Daniels of Troy, Ind., Aug. 31.—J. E. Fauk, a dentist of Swissville, O., married Miss Catheryn Porshman of Swissville, Sept. 11.—W. R. Honodel, a dentist at Los Angeles, Cal., married Miss Grace Knock of Los Angeles, Aug. 23.—W. H. Harvey, a dentist of Salinas, Cal., married Miss Nettie Metz of Salinas, Aug. 18.—E. S. Higgins, a dentist of Detroit, married Miss Alice M. Devlin of Ann Arbor, Sept. 8.—E. L. Inman, a dentist of Clyde, N. Y., married Miss Louise Corrin of Clyde, Sept. 2.—Marshall A. James, a dentist of Holley, N. Y., married Miss Florence Louise Robb of Holley, Sept. 2.—F. F. Kolm, a dentist at La Salle, Ill., married Miss Lena Steinmayer of La Salle, Aug. 25.—C. M. Leiblee, a dentist of Columbus, O., married Miss Edna O'Fallen of Piqua, O., Sept. 16.—E. E. Lawyer, a dentist of Iowa City, Ia., married Miss Mary E. Miller of Iowa City, Sept. 2.—F. McCluskey, a dentist of Glenwood, Ia., married Miss Nellie Tonner of Keokuk, Sept. 9.—E. A. Mead, a dentist at Hebron, Ill., married Miss Lora Hyde of Hebron, Aug. 26.—F. W. Parker, a dentist of Chicago, married Miss Grace Elizabeth Peabody of Chicago, Sept. 23.—P. W. Prewitt, a dentist of Georgetown, Ky., married Miss Sarah J. Hanna of Georgetown, Oct. 7.—W. H. Shaffer, a dentist of Chicago, married Miss Mabel Mason of Prairie View, Ill., Sept. 8.—J. W. Slonaker, a dentist of Chicago, married Miss Anna Martin of Chicago, Sept. 5.—F. H. Wolven, a dentist of Bloomfield, N. J., married Miss Rosah F. Hansbrough of Washington, Sept. 1.—G. H. Wardner, a dentist at Ottawa, Ill., married Miss Leona K. Jaeger of La Porte, Ind., Sept. 10.—S. A. Wright, a dentist of Minneapolis, married Miss Myrtle Wale of Minneapolis, Aug. 12.—C. R. Zickler, a dentist of Charlotte, N. C., married Miss Nellie L. Parrott of Lydia, S. C., Aug. 19.

TO ANOPHELES.

When dreamy night holds silent sway
  To drowse the toil-spent throng;
When beats the sun, and roars the day;
When grave the world, or whether gay,
Fasting, or festal, pipes away
  Thy per-estival song.

Sing on, sing on, Anopheles,
  To our pest-blest creation;
Sing, for ere long thy life-grip flees;
Sing nightly shame to busy bees;
Sing fast, for science soon decrees
  Thy clean extermination.

Sing a mal-aria to the throng;
  Or sing of icteroid sway;
Sing thou and sting the weak, the strong;
Sing, while thou canst, the whole night long;
Sing us, perchance, a noisome song,
  Or a paludal lay.

And, having sung, present thy bill,
And reap reward for toil;
Wages of sing and sting, will still
Forevermore thy cadence shrill;
Sing once more, like the swan; then fill
Thy lungs with Standard Oil.

—Jo WILKES in *N. Y. Sun.*

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